

**FOODWEB -project**  
**The Baltic environment, food and health: from habits to awareness**

# **How to Avoid the Exposure of Selected Contaminants via Food Items?**

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## Introduction

The purpose of this document is to give few simple, everyday advice how to avoid the possible exposure of certain compounds via food and drinking water. The food we use daily may contain various compounds from number of different sources. Some of these compounds may be harmful or even toxic to human beings.

Some of these compounds may have been released to the environment via human activities like flame retardants, dioxins and surfactants for example. Some compounds on the other hand may be formed during the food preparations and processing procedures like acrylamide, polyaromatic hydrocarbons and furans.

Some compounds are called as “natural toxins”, which for example plants might use as their defending mechanism against herbivores. As an example glykoalcaloids and nitrates include into this group. In the FOODWEB –project all together 18 compounds were studied. Please note that pesticides and radioactive compounds were not included in the project.

# Selected Compounds

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## Contaminants released from human activities

### Polychlorinated dibenzo dioxins (PCDDs) and Polychlorinated dibenzo furans (PCDFs)

Dioxins are mainly found from fish, meat and eggs. In Finland the main human exposure occurs through the fatty fish. For this reason the consumption of low fat and younger fish is recommended. Fatty fish like salmon and lamprey should be consumed less and used only as files without the skin and subcutaneous fat. Farmed fish usually contain less dioxins than wild fish.

The most vulnerable age groups for the exposure are fertile women and men, fetuses and infants. Recommendations according to Finnish Food Safety Authority are following; children, young people and people in a fertile age should eat Baltic salmon, trout or large un-gutted herring (length over 17 cm) only 1–2 per month.

### Polychlorinated biphenyls (PCBs)

PCBs are mainly found from fish. The most vulnerable groups for the exposure are people in a fertile age or even younger females, males, infants and fetuses. To avoid the PCB exposure the eating low fat fish instead of fatty fish is recommended. PCB concentration can also be lowered by removing the skin before preparing the fish.

### Polybrominated diphenyl ethers (PBDEs)

Polybrominated flame retardants can mainly be found from fish. It is recommended to eat wide range of fish. Also the reduction of the consumption of animal fats is recommended. One way to

lower the exposure to PBDE concentration is also to remove the skin and subcutaneous fat before preparing the fish.

## Perfluorinated compounds (PFC)

Perfluorinated compounds can mainly be found from fish, eggs, dairy products and canned fruits. These substances might have also been used in the coatings for food packaging materials like micro popcorn's. Preferring a balanced diet may lower the risk to be exposed to these compounds. Convenience food should also be removed from the packages before heating it up.

## Organo tins

Organic tin compounds are mainly found from fish and other seafood. To avoid the exposure to these compounds, it is recommended to avoid consuming shellfish, fish and other seafood that have been caught in the vicinity of the harbor areas.

## Cadmium (Cd)

The exposure to cadmium occurs mainly through crustaceans, mollusks, inner organs, mushrooms, linseed, cereal products, cacao, chocolate, berries and nuts. The most vulnerable groups for the exposure are the heavy consumers of these food items and smokers.

Variable diet and only moderate consumption of these food items containing high amounts of cadmium may lower the risk exposure. Cadmium can also exist in the drinking water so it is recommended to drink only that kind of water, which composition is well known.

Cadmium and lead has also been used in pottery glazing and colors. Cadmium can exist especially in red, yellow and orange colors. Avoiding the usage of old ceramic tableware may lower the exposure risk for cadmium.

## Lead (Pb)

The exposure to lead occurs mainly through the canned food, juices, old wines, inner organs and unwashed leafy vegetables. This is why it is recommended to wash the leafy vegetables before eating. Lead can also exist in the drinking water so it is recommended to drink only that kind of water, which composition is well known.

Lead and cadmium has also been used in pottery glazing and colors. The information of lead toxicity has increased over the years and the maximum allowable concentration of soluble lead in ceramic tableware has been tightened. People can still have some tableware that has been produced before 1970s , when lead was commonly used. Exposure through these old tableware or imported souvenirs might actually be quite significant. Use of cadmium and lead in the ceramics is still not forbidden.

### Mercury (Hg)

Exposure to mercury occurs mainly through large freshwater fish and tuna. The most vulnerable groups for the exposure are pregnant women and fetuses. The exposure can be avoided by diminishing the consumption of food items containing large amounts of mercury and by favoring the variable diet.

The recommendations for mercury according to EVIRA are following; children, young people and people in a fertile age can eat pike originating from inland waters or the Baltic Sea only 1–2 times per month. Pregnant women should not eat pike at all. People eating freshwater fish daily, should avoid also the consumption of other mercury collecting predatory fish. These are for example large perches, pike perches and burbot.

### Arcenic (As)

Arcenic can exist in the drinking water so it is recommended to drink only that kind of water, which composition is well known. The exposure to arcenic can be lowered by reducing the consumption of seaweed and cereal products that originate from the areas where the occurrence of arcenic is known to be a problem. Sometimes rice may also contain arcenic, which is why it is recommended to rinse the rice before boiling it and if possible also discarding the boiling water.

## Contaminants formed during the food preparations and processing

### Polyaromatic hydrocarbons (PAHs)

Polyaromatic hydrocarbons can be formed during the food preparation and processing especially when smoking or drying food items. The best way to lower the exposure to PAH - compounds is to avoid the excessive consumptions of smoked fish, meat or dried fruits. Peeling and washing fruits and vegetables before eating them may also lower the PAH exposure.

It should be noted that when grilling or barbecuing meat or fish the fat should not ignite and the food items should never be in the direct contact with flames or get burned. Low-fat meat and fish should be favored. Cooking with lower temperature for longer period of time also minimizes the formations of PAH compounds.

### Acrylamide

Acrylamide can be formed during the preparation and heating processes in starch rich food items. The highest concentrations have been found from French fries, potato chips and cereals. Acrylamide can also be formed into breads and cookies. It has been noted that acrylamide concentrations have significantly increased with longer roasting times and darker the product gets during the heating processes. The best way to lower the acrylamide exposure is to lower and shorten the roasting and baking times and to avoid the over consumption of French fries, potato chips, crisps, bread and morning cereals.

### Furans

Furans are formed during the food preparation and processing procedures in the similar conditions as acrylamide. Furans can be found from coffee, readymade children's food and other canned food. The best way to avoid the exposure is to lower the consumption of readymade meals and other canned food. It is also important to avoid the overheating of food items during the domestic cooking.

## Natural contaminants

### Mycotoxins

Mycotoxins are toxic compounds formed in specific conditions and synthesized by some molds. These compounds can be present in cereals, nuts, dried fruits, spices, wine, coffee and cacao. The effective food control and proper conservation conditions lowers the exposure to these compounds. It is not recommended to eat food items with signs of molds or with unpleasant smell.

### Glykoalcaloids

Glykoalcaloids are natural compounds synthesized by plants of the *Solanaceae* -family, like tomato and potato. These plants use glykoalcaloids as their defense mechanisms against pests and diseases. The exposure to these compounds can be avoided by eating only familiar plants. Before cooking, all potatoes with green parts should be removed. Potatoes should also be stored in a dark and cool place, which prevents the formation of glykolalcaloids. Also eating only ripe tomatoes is recommended.

### Nitrates

Nitrates are present in the environment in various compounds, but can still accumulate to plants and drinking water especially as a result of fertilization. The highest concentrations are found from the leafy parts of plants, while concentrations in seeds and stem are lower. The highest concentration in potatoes can be found from the peel but in carrots and beetroots from their inner parts. Peeling potatoes might lower the exposure risk at some extent. The highest nitrate concentration in salad occurs in the outer leaves. For this reason, it is recommended to remove these outer leaves before eating leafy salads. Also washing the leafy vegetables may lower the nitrate concentrations. Especially high nitrate concentrations containing food items like rucola and spinache should be consumed only in moderation.

Nitrate is also used as an additive in cheese and meat products. Consuming these food items only in moderation lowers the amount of total exposure.



## Conclusions

Preferring variable diet, with moderate consumption is the key to human health and wellbeing.

