

Frequently Asked Questions about coumarin in cinnamon and other foods

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Coumarin is a flavouring which is found in higher concentrations in the types of cinnamon grouped together under the name “cassia cinnamon”. Relatively small amounts of coumarin can already damage the liver of particularly sensitive individuals. However, this is not permanent damage. Isolated coumarin may not be added to foods. If coumarin is contained in parts of plants added to flavour foods, then it is limited to two milligrams per kilogram food. Checks by the official food control authorities had shown that this level has been exceeded, in some cases considerably, in cinnamon biscuits. This prompted the Federal Institute for Risk Assessment to assess the potential health risk for consumers from coumarin in cinnamon-containing foods and to establish a tolerable daily intake (TDI). Given the high levels of coumarin measured, the Institute advises consumers to only eat moderate amounts of cinnamon-containing foods, particularly in the run-up to Christmas. In response to the numerous inquiries from the media and consumers, BfR has compiled questions and answers on coumarin in cinnamon.

What is coumarin and where does it occur?

Coumarin is a natural flavouring and perfume that is found in many plants. It occurs in higher concentrations in the types of cinnamon grouped together under the name “cassia cinnamon”, for instance woodruff, tonka beans and melilot.

Where is coumarin used?

Synthetic coumarin is used in cosmetics. It smells of fresh hay. Coumarin is also used for medicinal purposes to treat oedemas. Isolated coumarin may not be added to foods. If it is contained in parts of plants added to flavour foods (as is the case with cinnamon), the amount of coumarin is limited to 2 milligrams per kilogram food in accordance with the Flavourings Ordinance.

How much coumarin does cinnamon contain?

A rough distinction can be made between two types of cinnamon. Ceylon cinnamon only contains low levels of coumarin which are safe from the Institute’s risk assessment perspective. By contrast, cassia cinnamon contains high levels of coumarin and large amounts of this cinnamon should not, therefore, be eaten.

How can consumers distinguish between Ceylon cinnamon and cassia cinnamon?

It is almost impossible for consumers to distinguish between Ceylon cinnamon and cassia cinnamon in cinnamon powder. The situation is different in the case of cinnamon sticks. Whereas in the case of cassia cinnamon a relatively thick layer of the bark has been rolled into a stick, the cross-section of a Ceylon cinnamon stick looks more like a cigarette – several thin layers of bark have been rolled up into a cinnamon stick resulting in a comparatively compact cross-section. The origin of the cinnamon is not normally declared on the packaging; sometimes false information has been supplied in the past.

Have maximum levels been set for coumarin in cinnamon and who is responsible for monitoring compliance?

No maximum level has been established for coumarin as yet. Consumer safety is, however, ensured by the general food law provisions which prohibit the marketing of “unsafe foods”. Furthermore, BfR believes it would be prudent to establish maximum coumarin levels for cinnamon. BfR will prepare the scientific basis for this. If coumarin-containing plant parts like cinnamon are used for flavouring, then the amount of coumarin is limited to 2 milligrams per kilogram food according to the Flavourings Ordinance.

Food manufacturers and importers are responsible for ensuring compliance with maximum levels. They may not place harmful foods on the market.

What happens when maximum levels are exceeded?

The food control authorities of the federal states monitor whether maximum levels are complied with. Examinations of cinnamon-containing foods by individual monitoring bodies in the federal states in the spring revealed cases where the admissible coumarin levels had been considerably exceeded. Based on the Flavourings Ordinance products of this kind would not be suitable for sale or consumption.

It is down to the federal states to decide whether to take steps to reduce coumarin levels and to protect consumers from possible damage to their health and from foods that are unfit for consumption. The federal states have since issued consumption recommendations. They are provisional.

Can too much coumarin damage health?

From the use of coumarin in the medicinal field, it is common knowledge that relatively low doses can already cause liver damage in a small group of particularly sensitive individuals if the medicinal products are administered over a few weeks. In minor cases this leads to an elevation of liver enzymes in blood, in severe cases to inflammation of the liver which manifests as jaundice. The exact mechanism of action is not known but the effects are reversible.

Can coumarin induce tumours?

In animal experiments very high levels of coumarin administered over long periods did trigger cancer in rats and mice. For humans there are no reports of coumarin-related tumour formation.

Should a consumer who regularly eats larger amounts of cinnamon biscuits expect damage to his health?

Consumers who have eaten large amounts of cinnamon in the past have no reason to worry that their liver has suffered permanent damage. The liver of patients who developed minor to moderate liver inflammation caused by the administration of coumarin recovered fully just a few weeks after the medication was discontinued.

“My grandmother used to bake with cinnamon”

The fact that a food, a food ingredient or a food additive has been used and eaten for a long time does not, in itself, mean that it poses no risk for consumers. This also applies to plant ingredients in foods. Scientific understanding continues to grow as does, in parallel, knowledge about the possible risks. Besides coumarin in cinnamon, glycyrrhizin in liquorice is another example of this kind of “newly” identified risk. The risk question relates to the amount

ingested. A marketing restriction is often not enough to protect consumers. That was the case for liquorice and is the case for coumarin in cinnamon and cinnamon-containing foods.

How does BfR assess the risk from coumarin in cinnamon?

BfR has assessed the potential health risk from coumarin in foods. It believes there is a risk of liver damage in particularly sensitive individuals. BfR has, therefore, established a tolerable daily intake (TDI). This amount can be consumed over a lifetime without posing a risk to health. The TDI is 0.1 milligram coumarin per kilogram body weight and day. This also applies to particularly sensitive individuals. The European Food Safety Authority decided on the same value in its coumarin assessment. If this level is exceeded for a short time only, there is no threat to health.

What should the consumer bear in mind if he wishes to reduce the risks?

To avoid this tolerable daily coumarin intake being exceeded, larger amounts of foods with high coumarin levels should not be eaten.

If one takes the highest coumarin levels in cinnamon biscuits supplied to BfR at the beginning of October 2006, then the tolerable daily intake for infants could already be exhausted by their eating three star-shaped cinnamon biscuits if they contain the highest measured levels of coumarin and there are no other sources of coumarin. Adults would need to eat about 15 of them. BfR, therefore, recommends – especially in the run-up to Christmas – that cinnamon biscuits should be eaten in moderation and attention paid to the total amount consumed – also from other foods like, for instance, rice pudding with cinnamon.

Mass catering facilities for children and schools should orient themselves towards these findings and adapt their menus to the current situation. Under these circumstances, the managers of kindergartens and after-school facilities should only offer cinnamon-containing biscuits on a limited scale after talking to parents.

How does BfR protect consumers?

BfR has assessed the potential health risk for consumers from coumarin in cinnamon-containing foods and established a tolerable daily intake. The Institute has shared the results of its assessment with the Federal Ministry of Consumer Protection and the public at large. Given the high levels of coumarin measured, BfR advises moderate consumption of cinnamon-containing foods. Furthermore, the Institute believes that it would be prudent to establish maximum coumarin levels for cinnamon. BfR will prepare the scientific basis for this.

BfR is currently examining the coumarin levels in other foods. They include certain teas and a wide range of cereals some of which have higher concentrations of cinnamon.