

Facts about cadmium (Cd)

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1. What is Cd?

Cd is a chemical element and a natural constituent of the Earth's crust. Like lead, zinc, copper and other elements, it is a heavy metal. Cd occurs naturally - usually in connection with other substances - in the air, water, and earth and as a result in the plant and animal food chain.

2. Sources of Cd

Different sources contribute to human exposure to Cd in different degrees. Significant contributions are made by cigarette smoke, fertiliser (built up in plants via water and soil), burning fossil fuels (via air and water) and industrial emissions (manufacture of batteries, pigments and much more). The Cd load in the soil is partially of natural origin; volcanic soils clearly have higher levels than others.

3. Occurrence of Cd in cocoa and chocolate

Many plants, including the cocoa tree, take in Cd that occurs naturally or has found its way into the soil through environmental influences through their roots. Soils in cocoa cultivation areas have different levels of Cd. Cocoa pods from Latin America generally contain more Cd than cocoa pods of other provenances. According to a scientific study by the European Food Safety Authority (EFSA)¹⁾ conducted in the year 2009, the Cd concentration in cocoa is on average 0.18 mg/kg (N=542), with maximum values up to 2 mg/kg. Studies in member companies of CHOCOSUISSE have even found individual maximum values of up to 4 mg/kg. The Cd entrapped in plants and fruits cannot be eliminated by purification or other processing steps in food production. An evaluation of analytical data from CHOCOSUISSE member companies resulted in an average Cd concentration of 0.02 mg/kg (N=68) for milk chocolates and of 0.22 mg/kg (N=196) for dark chocolates.

4. Toxic effects of Cd

The Cd taken in builds up in the body and can damage the kidneys and liver and attack the bones at high loads over time. It is also classified as carcinogenic in connection with the intake of Cd by inhaling cigarette smoke. According to current knowledge¹⁾, the human body takes in Cd through numerous foods. The quantities of chocolate typically consumed make up only an insignificant part of Cd intake.

5. Tolerable Cd intake

In March 2009, the EFSA lowered the maximum value for tolerably weekly intake (TWI) of Cd to 0.0025 milligrams (mg) (= 2.5 micrograms) per kilogramme of body weight based on new scientific findings. Previously, the TWI of 0.007 milligrams provisionally set by the World Health Organization (WHO) held sway. The new TWI is equivalent to a daily intake of 0.025 mg Cd for a 70 kg man, of 0.20 mg for a 55 kg woman and of 0.009 mg for a 25 kg child. Large quantities of chocolate would have to be consumed on a regular basis to reach the new tolerance value. In the case of milk chocolate (average Cd concentration 0.02 mg/kg), a man would have to eat almost ninety 100 g bars per week, a woman just under seventy 100 g bars per week and a child more than thirty 100 g bars per week! In the case of dark chocolate (average Cd concentration 0.22 mg/kg), a man would have to eat eight 100 g bars per week, a woman more than six 100 g bars per week and a child almost three 100 g bars per week.

6. Legal situation

In the EU, maximum concentrations of cadmium in chocolate were established on 12 May 2014. Regulation (EC) No. 1881/2006 setting maximum levels for cadmium in foodstuffs were supplemented accordingly:

Milk chocolate < 30 % total cocoa dry matter	0,10 mg/kg
Schokolade mit < 50 % Gesamtkakaotrockenmasse; Milkschokolade mit ≥ 30 % Gesamtkakaotrockenmasse	0,30 mg/kg
Schokolade mit ≥ 50 % Gesamtkakaotrockenmasse	0,80 mg/kg
Kakaopulver für den Endverbraucher oder als Zutat in gesüßtem Kakaopulver für den Endverbraucher (Trinkschokolade)	0,60 mg/kg

The new maximum values apply as of 1 January 2019.

Though maximum Cd quantities are fixed for many foods in Switzerland (meat, fruit and vegetables, cereals, rice, etc.), this has not yet been done for cocoa and chocolate products. Harmonisation of the law on the part of Switzerland is to be expected as a result of the new EU regulations.