



## Arsenic in Foods

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In late 2011, Dr. Oz featured his investigative work on arsenic in apple juice on his television show. Since the popular media is one of the most common sources of information on food, health, and wellness, there has been heightened awareness of the presence of arsenic, as well as other “chemicals,” found in foods. In addition to juices, a large focus of consumer concern has been rice and some rice-based products commonly used in infant foods. This publication attempts to allay such concerns.

### What Is Arsenic?

Arsenic is a naturally occurring element in the environment. It is ubiquitously present in the air, water, and soil and in foods. Environmental arsenic comes from natural and human-made sources, such as mineral ore mining or from various agricultural uses.

### Forms of Arsenic

Arsenic in foods is present in two forms—inorganic and organic. It is important to consider the form when discussing arsenic in foods. Unless otherwise specified, the amount of arsenic reported (in parts per billion, or ppb) is the total arsenic, in both the inorganic and organic forms. In general both forms are nonthreatening substances that occur in such low levels that the FDA sees no reason to change our diet when they are detected.

Types of organic arsenic such as monomethylarsinic acid (MMA), dimethylarsinic acid (DMA), arsenobetaine (present in seafood), arsenenolipids, and arsenosugars are naturally present in foods at concentrations that are essentially harmless. This naturally occurring arsenic is not toxic. Inorganic arsenic, by contrast, is also harmless at very low concentrations but is

hazardous when present at elevated levels and at long-term exposures (IFIC, June 6, 2012).

### Food Containing Arsenic

All plants, whether they are conventionally or organically grown, contain arsenic taken up from the soil. Foods that are derived from plants, including juices and rice, thus also contain low levels of arsenic. There is also detectable arsenic in our drinking water. Thus, arsenic is essentially found in all food groups.

**Drinking Water.** The EPA monitors arsenic in our drinking water. The EPA maximum nontoxic level and the World Health Organization guideline for total arsenic in drinking water are both 10 ppb. This limit was modified from 50 ppb in 2001. The level was determined considering people's high daily water intake and the many different forms in which water is used, such as for making beverages, soups, and other foods.

**Juice, Rice, and Rice Products.** FDA has been monitoring arsenic in our foods for more than 20 years and in juices for about six years (FDA, September 19, 2012). Since total arsenic in juices ranges from not detectable to very low levels, FDA has not deemed it necessary to set a limit for arsenic in juices.

In November 2012, Consumer Union published the results of their analyses of various rice samples using a maximum total arsenic limit of 5 ppb (which they equated to 5 ppb of inorganic arsenic). They chose to follow the standard set by New Jersey for their drinking water, which is 5 ppb. Most of their results indicated that the food tested contained less than 10 ppb inorganic arsenic, and thus the levels remain below the US

maximum limit for drinking water.

In response to these increased concerns and to reassure consumers that their health is an important priority, the FDA has increased their monitoring of arsenic in rice and rice products. The agency broadened their collection of data, which will allow them to conduct a full risk assessment. They will then analyze their results to determine how to minimize risks, if any, especially emphasizing children's foods and diet (September 24, 2012).

Overall, the amount of arsenic in US rice is similar to but smaller than the amounts in rice from China, Japan, Australia, the UK, and the EU. Many populations consume up to five times more rice, with its elevated levels of arsenic, than Americans and have lower disease rates. Gilbert-Diamond et al. (2011) reported that the arsenic in the median amount of rice consumed by 229 pregnant women in their study was much less than the 10 ppb per day maximum arsenic set for drinking water. High levels of inorganic arsenic have been reported in organic brown rice syrup, which is used in some parts of the world as a replacement for high fructose corn syrup, but it is less commonly used in US food products (Jackson et al. 2012). US-grown rice contains elevated total arsenic levels due to a disproportionate amount of DMA, a harmless organic form of arsenic, rather than to an elevated exposure to inorganic arsenic.

The US population as a whole has an exposure from foods of less than 0.95 ppb inorganic arsenic/day at the 75th percentile and less than 5.2 ppb of inorganic arsenic/day at the 95th percentile. One- to two-year-olds in the US have an exposure of less than 0.34 ppb inorganic arsenic/day at the 75th percentile (Ternary et al., July 2012).

### Understanding Risks in the Proper Perspective

Arsenic is present in most, if not all, of our foods because the element is ubiquitous in our environment. Eliminating a food group will not eliminate arsenic. But just because arsenic is detected in our food does not necessarily mean it is bioavailable or absorbed by the body. Comparing total arsenic in water, which is used in many forms throughout the day, to foods that may be consumed in only 1 to 2 servings a day is not appropriate and does not make sense.

To date, there are no documented incidents of human health problems attributed to arsenic in US rice. (Codex Commission on Contaminants in Foods, March 26–30, 2012). FDA does not recommend changes in the consumption of juice, rice, and rice products. Rather, the FDA recommends eating a balanced diet, including a wide variety of grains (FDA, September 24, 2012).

### References

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