

Getting to the Core of the Issue: Arsenic in Apple Juice

The controversy began in the fall of 2011 when **Dr. Mehmet Oz** told viewers of his *Dr. Oz Show* that ten of three dozen apple juice samples that he had tested contained total arsenic levels exceeding 10 parts per billion (ppb), the legal limit for arsenic in bottled and public water in the United States. The U.S. Food and Drug Administration followed up on this claim by conducting its own tests on 94 samples, including testing a sample also tested by Dr. Oz. The FDA test results did not support Dr. Oz's claim and, in fact, all samples tested were below the level of 10 ppb for total arsenic.



The controversy was reignited with a report in the January issue of **Consumer Reports** indicating high arsenic and/or lead levels in some apple and grape juice beverages that Consumers Union, parent company of Consumer Reports, had tested. Should consumers be worried? Read on to find out....

What is arsenic? Arsenic is an element naturally found in water, food and soil. It can occur in foods and the environment as a naturally occurring substance or as a result of contamination from human activity. Arsenic is not usually found as a pure metal, but in combination with other materials.

There are two types of arsenic: organic and inorganic. Scientists believe that the inorganic forms of arsenic are the harmful forms, while the organic forms of arsenic are essentially harmless.* Because both forms of arsenic have been found in soil and ground water, small amounts may be found in certain food and beverage products, including fruit juices and juice concentrates.* *Some scientific studies have shown that two forms of organic arsenic found in apple juice, dimethylarsinic acid (DMA) and monomethylarsinic acid (MMA), may also be a health concern.*

Why is arsenic being found in fruit juices? Organic and inorganic forms of arsenic can be naturally found in soil and ground water and can be taken up by plants through their vascular system. As a result, small amounts of arsenic may be found in certain food and beverage products. In addition, up until 1970, arsenic-based pesticides were commonly used in U.S. agriculture. Even though 40 years have passed, trace levels of arsenic can still be found in some agricultural settings, which may also lead to small amounts of arsenic in foods and beverages.

Is there a standard, or limit, for arsenic in foods or beverages? At this time, there is no limit, or standard, for arsenic in foods and beverages in the U.S. The FDA considers that scientific evidence indicates that if arsenic occurs in foods or beverages, it almost always does so at very low levels. There is a standard for arsenic in bottled water. The maximum level of arsenic allowed in bottled water is 10 ppb. Because of the recent controversy, the FDA is presently collecting data and will be evaluating whether a standard for inorganic arsenic should be established for foods and beverages as well. For now, the FDA considers that arsenic present in foods and beverages in the U.S. does not present a public health risk.

Why the current controversy? Consumers Union, publisher of *Consumer Reports* magazine, chose to follow up on the testing of apple juice for arsenic because fruit juices are a mainstay in the diet of many children. Consumers Union tested 78 samples of apple juice and 9 samples of grape juice, for a total of 88 samples from five different brands. Samples were tested for total arsenic and lead. Their results indicated that:

- 5 samples of apple juice and 4 samples of grape juice had total arsenic levels that exceeded federal drinking-water standards of 10 ppb. This represents about 10% of total samples having elevated arsenic levels. Total arsenic levels ranged from 1.1 to 13.9 ppb for apple juice and from 5.9 to 24.7 ppb for grape juice.
- 25% of samples had lead levels that exceeded the bottled-water limit of 5 ppb. The top lead level for apple juice was 13.6 ppb; for grape juice, 15.9 ppb.

Actual results from the study are shown in Table 1. Samples tested included were ready-to-drink bottles, juice boxes, and cans of concentrate.

Table 1. Consumer Reports. Januarv. 2012.

After reviewing their study findings, Consumers Union is advocating for federal limits for total arsenic and lead in juice.

Should we be worried? While I don't have the actual data, I ran some quick statistics on the data presented in Table 1. Some variation is expected from any analytical test, even from the same sample. The only significant differences that I could note were:

- All 3 samples of **Great Value** 100% apple juice (Walmart) had elevated total arsenic levels (range above 10 ppb).
- The elevated arsenic levels in samples of **Apple & Eve** (1 sample) and **Mott's** 4.23-oz juice box (1 sample) are not significantly higher than the other samples tested from this brand.
- Significantly more samples contained elevated levels of lead, representing more brands.

Juice (in alphabetical order)	Total arsenic ¹ (ppb)	Lead (ppb)
365 Everyday Value Organic 100% Apple Juice (Whole Foods) ²	7.0 to 7.1	3.5 to 3.8
America's Choice 100% Apple Juice (A&P)	1.4 to 4.4	0.5 to 5.6
Apple & Eve 100% Apple Juice (6.75-ounce juice boxes)	5.0 to 10.5	1.9 to 3.4
Gerber 100% Apple Juice (4-ounce bottles)	5.8 to 9.7	3.4 to 13.6
Gerber Organic 100% Apple Juice (4-ounce bottles)	5.5 to 5.7	2.2 to 2.3
Gold Emblem 100% Apple Juice (CVS)	3.1 to 9.4	2.9 to 5.6
Gold Emblem 100% Grape Juice (CVS)	5.9 to 7.5	6.5 to 8.6
Great Value 100% Apple Juice (Walmart)	10.1 to 13.9	3.7 to 5.1
Great Value 100% Apple Juice (Walmart, 10-ounce bottles) ³	5.5	3.4
Great Value 100% Apple Juice with fiber Not from Concentrate (Walmart)	2.9 to 3.9	0.1 to 0.2
Joe's Kids 100% Apple Juice (Trader Joe's, 6.75-ounce juice boxes)	4.1 to 5.7	5.3 to 9.7
Juicy Juice 100% Apple Juice Non Frozen Concentrate ⁴	1.9 to 4.2	1.4 to 2.2
Juicy Juice 100% Apple Juice	1.7 to 3.0	0.8 to 2.3
Juicy Juice 100% Apple Juice (10-ounce bottles)	1.7 to 1.9	1.1 to 3.5
Juicy Juice 100% Apple Juice (6.75-ounce juice boxes)	1.3 to 2.8	1.4 to 2.8
Lucky Leaf 100% Apple Juice ²	2.3 to 3.2	0.8 to 1.2
Minute Maid 100% Apple Juice (10-ounce bottles)	6.2 to 6.7	4.2 to 6.5
Minute Maid 100% Apple Juice (juice box packaged for McDonald's)	2.0 to 5.6	0.8 to 5.3
Mott's Original 100% Apple Juice	4.0 to 7.9	2.1 to 3.8
Mott's Original 100% Apple Juice (4.23-ounce juice boxes)	4.0 to 10.2	0.6 to 0.7
Mott's Original 100% Apple Juice (6.75-ounce juice boxes)	2.1 to 2.8	0.6 to 1.3
Nature's Own 100% Apple Juice ²	2.3 to 2.4	0.9 each
Old Orchard 100% Apple Juice Frozen Concentrate ⁴	1.6 to 4.8	0.6 to 1.3
Red Jacket Orchards 100% Fuji Apple Juice	1.3 to 1.8	0.1 to 0.2
Rite Aid Pantry 100% Apple Juice	1.1 to 6.4	0.4 to 2.6
Seneca 100% Apple Juice Frozen Concentrate ⁴	2.3 to 4.4	0.9 to 5.5
Tropicana 100% Apple Juice (15.2-ounce bottles)	1.5 to 2.1	0.5 to 1.0
Walgreens 100% Apple Juice	4.0 to 6.8	2.3 to 6.9
Walgreens 100% Grape Juice	9.7 to 24.7	10.1 to 15.9
Welch's 100% Apple Juice Pourable Concentrate ⁴	1.1 to 4.1	0.6 to 1.3
Welch's 100% Grape Juice	7.1 to 12.4	3.5 to 9.2

¹ Includes organic and inorganic arsenic. ² Two lots tested. ³ One lot tested. ⁴ Reconstituted; assumes no arsenic or lead from added water

→ We do not know if the arsenic levels reported are for the harmful inorganic type, or the organic form.

While scientists and the federal government consider the issue, Extension educators can encourage consumers, and especially parents of young children, to take some positive steps to limit exposure to any potentially harmful contaminant. In the case of arsenic, this would include:

- **Testing well water.** If your home isn't on a public water system, have the water tested for arsenic and lead. Contact your local health department.
- **Limit children's juice consumption.** Nutrition guidelines set by the American Academy of Pediatrics to reduce childhood obesity and tooth decay, recommends that infants younger than 6 months should not drink juice; children up to 6 years of age should consume no more than 4 to 6 ounces a day. Diluting juice with water can help meet those goals. The Consumer Reports article indicated that up to 26% of children aged 2 and under, and 45% of children ages 3 to 5 drink more than the recommended amount of juice each day.
- **Consider your food and beverage choices.** It is said that variety is the spice of life, and that can be important when protecting your health and the health of your family. Select a variety of brands of juice for children. Selecting from a variety of manufacturers will help spread the risk that may come from one particular brand that is higher in contaminants. Consumers should be aware that much of the apple juice produced in the U.S. is prepared from concentrate blended with water. The concentrate may come from multiple sources, with most coming from China. Other countries which supply concentrate to the U.S. are Argentina, New Zealand, South Africa and Turkey. Some brands use only U.S. grown apples. While tests have not shown that juice produced from U.S. grown apples is safer, checking product labels for country of origin information, if available, may be helpful in making purchase decisions.

The bottom line. The article in Consumer Reports clearly stated an intention to influence legislation that would establish arsenic standards in juice and other foods, especially foods for children. While the study results do shed light on one potentially harmful element in food and beverages, the Food and Drug Administration does not consider juices to present a public health risk to either children or adults at this time.

References:

Consumer Reports. Arsenic in Apple Juice. January 2012. Pp. 22-27.

U.S. Food and Drug Administration. Questions & Answers: Apple Juice and Arsenic. December 16, 2011.

<http://www.fda.gov/Food/ResourcesForYou/Consumers/ucm271595.htm>

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