

Posted February 6, 2003

Dr. Gordon:

*Would you explain the difference or give me a reference on heavy metal testing for organic and inorganic Arsenic in terms of pathological effects on the body. Thanks  
Andrew Garner, M.D.*

Dear Doctor,

I find that Arsenic is still used to poison people and that HAIR testing is entirely valid to detect exposure. Fortunately HEAVY DETOX works very well but since ALL METAL TOXICITIES are exacerbated by the presence of concurrent metal toxicities, i.e. lead, cadmium, mercury etc., I always will also recommend EDD. Use 1 cap per 10 pound of body weight in divided dosages throughout the day along with the Heavy Detox taken at night. Since we all know that good medicine requires attempting to REMOVE to whatever extent possible the SOURCE of the Arsenic or other toxic metal, please read the attached brief review that may further help answer your questions about organic and inorganic etc.

Sincerely,

Garry F. Gordon MD, DO, MD(H)  
President, Gordon Research Institute  
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### **ARSENIC Toxicity**

manbironline

Significant exposure to arsenic occurs through both anthropogenic and natural sources. Arsenic is released into the air by volcanoes and is a natural contaminant of some deep-water wells. Occupational exposure to arsenic is common in the smelting industry (in which arsenic is a byproduct of ores containing lead, gold, zinc, cobalt, and nickel) and is increasing in the microelectronics industry (in which gallium arsenide is responsible). Low-level arsenic exposure continues to take place in the general population (as do some cases of high-dose poisoning) through the commercial use of inorganic arsenic compounds in common products such as wood preservatives, pesticides, herbicides, fungicides, and paints; through the consumption of foods and the smoking of tobacco treated with arsenic-containing pesticides; and through the burning of fossil fuels in which arsenic is a contaminant. Arsenic was also a major ingredient of Fowler's solution and continues to be found in some folk remedies.

### **METABOLISM**

The toxicity of an arsenic-containing compound depends on its valence state (zero-valent, trivalent, or pentavalent), its form (inorganic or organic), and the physical aspects governing its absorption and elimination. In general, inorganic arsenic is more toxic than organic arsenic, and trivalent arsenite is more toxic than pentavalent and zero-valent arsenic. The normal intake of arsenic by adults occurs primarily through ingestion and

averages around 50 ug/d (range, 8 to 104 ug/d). Most (around 64 percent) of this amount is accounted for by organic arsenic from fish, seafood, and algae; the specific arsenic compounds obtained from these sources are arsenobetaine and arsenocholine, which are relatively nontoxic and are rapidly excreted in unchanged form in the urine. After absorption, inorganic arsenic accumulates in the liver, spleen, kidneys, lungs, and gastrointestinal tract. It is then rapidly cleared from these sites but leaves a residue in keratin-rich tissues such as skin.

### CLINICAL FEATURES

Acute arsenic poisoning from ingestion results in increased permeability of small blood vessels and inflammation and necrosis of the intestinal mucosa; these changes manifest as hemorrhagic gastroenteritis, fluid loss, and hypotension. Delayed cardiomyopathy accompanied by electrocardiographic abnormalities may develop. Symptoms include nausea, vomiting, diarrhea, abdominal pain, delirium, coma, and seizures. A garlicky odor may be detectable on the breath. Acute tubular necrosis and hemolysis may develop. The reported lethal dose of arsenic ranges from 120 to 200 mg in adults and is 2 mg/kg in children. Arsine gas causes severe hemolysis within 3 to 4 h of exposure and can lead to acute tubular necrosis and renal failure.

In chronic arsenic poisoning, the onset of symptoms comes at 2 to 8 weeks. Typical findings are skin and nail changes, such as hyperkeratosis, hyperpigmentation, exfoliative dermatitis, and Mees' lines (transverse white striae of the fingernails); sensory and motor polyneuritis manifesting as numbness and tingling in a "stocking-glove" distribution, distal weakness, and quadriplegia; and inflammation of the respiratory mucosa. Epidemiologic evidence has linked chronic consumption of water containing arsenic at concentrations in the range of 10 to 1820 ppb with vasospasm and peripheral vascular insufficiency culminating in "blackfoot disease," a dangerous condition affecting the extremities. Chronic arsenic exposure has also been associated with a greatly elevated risk of skin cancer and possibly of cancers of the lung, liver (angiosarcoma), bladder, kidney, and colon.

### LABORATORY FINDINGS

When acute arsenic poisoning is suspected, an x-ray of the abdomen may reveal ingested arsenic, which is radiopaque. The serum arsenic level may exceed 0.9 umol/L (7 ug/dL); however, arsenic is rapidly cleared from the blood. Electrocardiographic findings may include QRS complex broadening, QT prolongation, ST-segment depression, T-wave flattening, and multifocal ventricular tachycardia. Urinary arsenic should be measured in 24-h specimens collected after 48 h of abstinence from seafood ingestion; normally, levels of total urinary arsenic excretion are less than 0.67 umol/d (50 ug/d). Arsenic may be detected in the hair and nails for months after exposure. Abnormal liver function, anemia, leukocytosis or leukopenia, proteinuria, and hematuria may be detected. Electromyography may reveal features similar to those of Guillain-Barre syndrome.

### TREATMENT

Vomiting should be induced with ipecac in the alert patient with acute arsenic ingestion.

Gastric lavage may be useful; activated charcoal with a cathartic (such as sorbitol) may be tried. Aggressive therapy with intravenous fluid and electrolyte replacement in an intensive-care setting may be life-saving.

Dimercaprol is the chelating agent of choice and is administered intramuscularly at an initial dose of 3 to 5 mg/kg on the following schedule: every 4 h for 2 days, every 6 h on the third day, and every 12 h thereafter for 10 days. (An oral chelating agent may be substituted.) Succimer is sometimes an effective alternative, particularly if adverse reactions to dimercaprol develop (such as nausea, vomiting, headache, increased blood pressure, and convulsions). In cases of renal failure, doses should be adjusted carefully, and hemodialysis may be needed to remove the chelating agent-arsenic complex. Arsenic poisoning should be treated supportively with the goals of maintaining renal function and circulating red-cell mass.

<http://www.ajc.com/health/content/shared-auto/healthnews/foos/516998.html#>

### Eating Chicken May Boost Arsenic Exposure

MONDAY, Jan. 19 (HealthDayNews) -- Indulging in your favorite chicken dish may expose you to higher levels of arsenic than you think, government researchers say.

Arsenic levels in young chickens, or "broilers," may be three to four times greater than in other poultry and meat, they report in the January issue of *Environmental Health Perspectives*.

While the amount of arsenic people ingest by eating chicken appears to be well below tolerable daily intake levels, it is higher than previously recognized and may require government agencies to reassess total arsenic exposure, the authors conclude.

The study is the first to assess average levels of arsenic in chicken and then calculate how much of the substance people are ingesting when they consume different amounts of chicken. Arsenic is an approved feed supplement that farmers use to control intestinal parasites in chickens, particularly young chickens.

"If we're taking in more in chicken, then there's, in a way, less room to take in arsenic through the water," explains study author Tamar Lasky, a former U.S. Department of Agriculture epidemiologist now with the National Institutes of Health. Chicken is a staple of the American diet. Between 1970 and 2000, per capita consumption nearly doubled -- from an average of 40 pounds per year to about 78 pounds a year, reports the National Chicken Council.

Arsenic is a naturally occurring element found in food, drinking water and the environment. But exposure to high levels of the inorganic form, such as that found in wood preservatives, insecticides and weed killers, can be deadly.

Studies have linked long-term arsenic exposure in drinking water to cancer of the bladder, lungs, skin, kidney, nasal passages, liver and prostate, according to the U.S.

Environmental Protection Agency. It is also associated with cardiovascular, pulmonary, immunologic, neurologic and endocrine problems.

"This study appears to be much ado about nothing," says Richard Lobb, a spokesman for the National Chicken Council. The paper makes numerous assumptions -- not based on data in the study -- about arsenic levels in chicken livers and muscle tissues as well as the relationship between organic and inorganic arsenic, he says.

Arsenic in poultry feed, which represents the less toxic organic form, "is used responsibly and safely by poultry producers," Lobb adds.

Lasky and colleagues from the Agriculture Department's Food Safety and Inspection Service used national data measuring arsenic in chicken liver samples to estimate the amount present in muscle tissue, the part of the chicken that is most frequently consumed.

From 1994 to 2000, average arsenic concentration in young chickens ranged from 0.33 to 0.43 parts per million. The authors multiplied their estimates of arsenic in chicken muscle tissue by different levels of chicken consumption.

A person who eats an average amount of chicken -- about 2 ounces a day -- might ingest 3.6 micrograms to 5.2 micrograms of inorganic arsenic and 5.6 micrograms to 8.1 micrograms of total arsenic a day, they found.

By contrast, the top 1 percent of the population that consumes about 12 ounces of chicken a day would get much more of the substance: some 21 micrograms to 31 micrograms of inorganic arsenic per day and 33 micrograms to 47 micrograms of total arsenic per day.

For someone weighing 154 pounds, that's 0.30 to 0.44 micrograms per kilogram per day of inorganic arsenic -- well below the tolerable daily intake of 2 micrograms per kilogram per day, but still a sizable portion of the total. {Note: I've never heard the phrase "the toerable daily intake"?? Is there an intolerable daily intake?}

An expert committee administered jointly by the Food and Agriculture Organization of the United Nations and the World Health Organization determines the tolerable daily intake for arsenic. "This article is really meant to raise a bunch of questions for further investigation," Lasky says. "It's reasonable for consumers to say, 'We want to know more about this.'"