

Chromium and the Erin Brockovich Effect

By ACSH Staff — April 28, 2004

The public, who too frequently look to the five o'clock news, local papers, and magazines as sources of health information, is left wondering if it is safe to drink tap water, to heat food in plastic containers, or even to eat fried foods for fear of encountering a myriad of so-called carcinogens. How can the average American separate the wheat from the chaff to determine which of the unnerving tales hyperbolized by the press, if any, are valid, and which would better be fodder for the next sci-fi flick?

Take an article published in the Newark *Star-Ledger*, New Jersey's largest newspaper, entitled, "New Alarm Over Chromium 'Hot Spots'" (April 20, 2004). In this *Erin Brockovich* revival piece, reporter Alexander Lane may actually believe he is providing a service to readers, particularly those living in Hudson and Essex counties, home to several chromium waste sites but Lane sounds as if he looks to cinema for scientific data. *Erin Brockovich*, released in 2000, tells the story of a legal assistant who organizes a 650-plaintiff lawsuit against Pacific Gas and Electric (PG&E), whose plant was leaching chromium VI, or hexavalent chromium, into the Hinkley, California water supply. The suit blamed the chemical for a plethora of symptoms ranging from nosebleeds to miscarriages, Hodgkin's Disease to breast cancer, spinal deterioration to prostate cancer. The problem is this: there is no way that hexavalent chromium was responsible for the cluster of health problems in Hinkley. And there is ample, peer-reviewed scientific evidence backing that conclusion.

Unfortunately, much of this evidence came in after PG&E settled the case for \$333 million dollars. An admission of guilt? Hardly. As syndicated columnist and author Michael Fumento points out:

The Hinkley case is hardly the first in which huge amounts of money have been handed to sick or allegedly sick plaintiffs and their lawyers without scientific proof or even strong evidence. Dow Corning handed trial lawyers and their clients billions even though the evidence that silicone [breast] implants are safe has become overwhelming. PG&E made the monetary decision that giving up a third of a billion made more sense than leaving things up to the whims of an arbitrator trained not in science or medicine, but in law.

Perhaps due to the success of that "inspirational" film and PG&E's willingness to settle, people still fear that hexavalent chromium poses a risk to their health and to that of their children. Alexander Lane unfairly heightens this fear in his "hot spots" piece. He employs nail-biting phrases such as "highly toxic," "dubious scientific assumptions," and "various kinds of cancer." Obviously, his desire for readership outweighs his concern for the unnecessary stress level of individuals living in chromium-rich Hudson and Essex Counties. It certainly outweighs his journalistic responsibility to

report the facts.

The Skinny on Chromium

Chromium is a naturally occurring element present in the environment in several forms, the most common of which are elemental metallic chromium, trivalent chromium (III), and hexavalent chromium (VI). No taste or odor is associated with any chromium compounds.

Trivalent chromium is an essential dietary nutrient required for normal glucose, protein, and fat metabolism, and is found in fresh vegetables, fruit, meat, beef, grain, and yeast. A daily intake of 50-200 micrograms is recommended for adults. Because there is no evidence that inhaling, ingesting, or handling trivalent chromium has toxic or carcinogenic effects in humans, it is not regulated by the EPA, nor has it been classified as a carcinogen by the International Agency for Research on Cancer (IARC). In very high doses, it can produce moderate toxicity in animals, but this has not been confirmed in humans. It is not readily soluble in water.

Metallic and hexavalent chromium, on the other hand, are most commonly produced by or used in industrial processes such as steel works, high-temperature furnace linings, corrosion resistance, leather tanning, textile dyeing, inks, toners, pyrotechnics, lithography, photography, synthetic perfumes, and chemical synthesis. Hexavalent chromium compounds have been found to cause lung cancer *specifically* in industry workers who, via inhalation over long periods of time, are exposed to levels in air up to 1,000 times higher than those found in the environment. Therefore, the EPA has determined that hexavalent chromium *in air* is a carcinogen at high levels, but it does not regulate the amount in environmental air. Because workers could potentially be exposed to cancer causing levels, the Occupational Safety and Health Administration (OSHA) has placed an air limit for hexavalent chromium at 52 micrograms per cubic meter. This is well above the amount of hexavalent chromium in environmental air, which typically is .005 to .525 micrograms per cubic meter. In Hudson and Essex Counties, the New Jersey areas of dire concern in Lane's piece, measurements of hexavalent chromium in background air, indoor and out, were only .0012 micrograms per cubic meter. Hmmm.

Chronic *occupational inhalation* exposure to hexavalent chromium can, in fact, have non-cancer effects such as nasal ulcers, asthma, nosebleeds, sneezing, itching and runny nose. Inhaling smaller doses for short periods of time does not cause a problem in most people unless they have a chromium allergy. Similarly, ingesting or handling hexavalent chromium compounds is not harmful except in amounts far greater than that which has been found in the environment. Over time, workers handling substances containing a high content of hexavalent chromium can develop skin ulcers or dermatitis. It is not, however, absorbed through the skin.

Chromium produced by industry enters the air, water, and soil primarily in the trivalent and hexavalent states. In air, where it does not remain long, it exists as dust particles, which dissipate and eventually settle over land and water. Rain or snow accelerates this process. So what about water contamination? Most of the chromium that enters the water settles to the bottom. Of the small amount that dissolves, based on an EPA estimate, only 34% is the hexavalent form. It cannot volatilize back into air *from* water. Importantly, most hexavalent chromium in the environment is reduced to the harmless trivalent state, which, as we have already learned, is not

regulated by the EPA. And, no, it does not accumulate in fish.

Does Any of This Affect People?

So what happens if this small amount of hexavalent chromium is ingested via contaminated water or food? Most of it is converted to the trivalent form. The small amount absorbed into the blood is eliminated through the urine in a few days. The EPA has determined (pay attention, all you Alexander Lanes!) that there is insufficient evidence to label hexavalent chromium in food or water as a human carcinogen. Exhaustive epidemiological studies of communities near hexavalent chromium waste sites have found this to be true.

Because of the 1974 Safe Drinking Water Act, however, the EPA does regulate the amount of total chromium in water, an estimated 34% of which is in the hexavalent form, and has set a typically conservative limit of 100 micrograms per liter. According to them, the following levels are not expected to cause any harmful health effects: 1,400 micrograms per liter for 10 days, and 240 micrograms per liter for long-term exposure for children, and 840 micrograms per liter for long-term exposure for adults. Most states adopt this federal limit into their own regulations, including New Jersey, with California being one exception, having fearfully reduced its limit to 50 micrograms per cubic liter.

And what *Star-Ledger* readers and Erin Brockovich fans should know is that a survey in 1979 found the hexavalent chromium levels in Hudson County tap water ranged from 0.4 to 8.0 micrograms per liter, well below the federal limit! These acceptable values were recently confirmed by an ACSH phone call to a New Jersey Department of Environmental Protection Safe Drinking Water representative, Vince Monaco, who stated, "to the best of my knowledge, no [surface, community, or ground water] systems exceed this [100 micrograms per liter] limit." You can call him, if you're still scared.

There you have it. Breathe easy. These are the scientific facts. Perhaps they do not make for a blockbuster movie, but at least we can turn our attention to more valid health concerns (like tobacco-related cancers incidentally, you are more likely to be exposed to chromium by smoking). Of course, another alarmist report will come along, probably tonight around five o'clock.

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For more information on this topic, please see:

<http://www.nj.com/news/ledger.ssf?/base/news-14/108244274772980.xml> [1]

<http://www.nsc.org/library/chemical/chromium.htm> [2]

http://www.state.nj.us/cgi-bin/governor/njnewsline/view_article.pl?id=1484 [3]

<http://www.atsdr.cdc.gov/tfacts7.html> [4]

http://www.epa.gov/safewater/contaminants/dw_contamfs/chromium.html [5]

<http://www.epa.gov/ttn/atw/hlthef/chromium.html> [6]

<http://www.fumento.com/erinwsj.html> [7]

<http://www.fumento.com/brocklett.html> [8]

<http://www.fumento.com/pollution/brocko.html> [9]

http://www.state.nj.us/dep/srp/siteinfo/chrome/b_b_sum_3.htm [10]

and:

The British Medical Journal Vol. 320, Number 7226, "Potential exposure to chromium is not associated with poorer self reported health," 1 Jan 2002.

Cancer Clusters: Findings vs. Feelings [11], the American Council on Science and Health, 2002.

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[2] <http://www.nsc.org/library/chemical/chromium.htm>

[3] http://www.state.nj.us/cgi-bin/governor/njnewsline/view_article.pl?id=1484

[4] <http://www.atsdr.cdc.gov/tfacts7.html>

[5] http://www.epa.gov/safewater/contaminants/dw_contamfs/chromium.html

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