Lead In Spices

Thomas Tarantelli

Thomas.Tarantelli@Agriculture.ny.gov
TomTarantelli@aol.com

New York State Department of Agriculture & Markets Food Laboratory
NYS Food Lab
ISO 17025 accredited

Toxic Metal Analysis in Food (Spices) by Closed Vessel Microwave Digestion and ICP-MS

Thermo ICAP-Q
ICP-MS

Lead sensitivity ~ 19 ppb

Thomas.King@Agriculture.ny.gov
The enforcement of New York State Agriculture and Markets Laws and Regulations provides a vital service that is critical in maintaining the safety of the food supply from producer to the retailer. The Division of Food Safety and Inspection is the Department's largest Division, with a staff of approximately 200 full-time employees including about 115 food inspectors. The Division has jurisdiction over approximately 28,000 food handling establishments and conducts a variety of activities including:

Unannounced Sanitary **Inspections** of: Food Manufacturers

- Wholesale Bakeries
- Beverage Processors
- Food Warehouses
- Refrigerated Warehouses
- Retail Food Stores (Supermarket to Small Retailers)
- Slaughterhouses (not regulated by USDA)
- Fish Processors
- Rendering/Disposal Plant and Transportation Services
- **Sampling** of Food Products for analysis by New York State Agricultural Information Seminars for the Food Industry on Food Safety and Law
- Investigation of Consumer Complaints
- **Licensing** of Food Operators of Various Types of Establishments
The Coloring of Candies.

Beloit College,
Chemical Laboratory,
October 16, 1886.

Dr. J. T. Reeve, Sec. State Board of Health:

Dear Sir:—In accordance with your request for information as to the results of analyses of samples of confectionery, made in this laboratory at different times, I take pleasure in laying before you such pertinent data concerning them as are at hand.

My attention has been repeatedly called during the last year or more to the nature of confectionery sold in this and other cities through the state, and particularly to the coloring matters used so freely in their manufacture. Extended analyses have not been made, however desirable they may appear; but many samples have been examined. As these examinations are stretched over a considerable period and were instituted for various reasons, only such records were entered in my laboratory note books as were deemed likely to prove of extraordinary interest. There were, however, three cases to which particular attention should be called. In each of these, highly colored candies were alleged to have produced serious consequences, and in each case a sample of the candy was sent here for chemical analysis by the physician in charge of the case.

In two of these cases Chrome Yellow [neutral Chromate of Lead] was the chief coloring matter; and in the third, Eosine.

In the first of these cases the sample was a bar about two and one-half inches in length of a pasty consistency, coated largely with chocolate (§) and showing an added a pale yellow color. It was a clear case of Chrome Yellow (Lead Chromate) coloring, as the following figures show. A section of the bar, about one-half inch in length was taken from near the center, and the lead was weighed as the sulphate.

Weight of candy taken........................................4.263 grammes.
Weight of Lead Sulphate.....................................4.650 grammes.
Equivalent to Chromate of Lead.........................................0.0052 grammes.

i.e. One ounce would contain 0.04 grains Lead Chromate.

The second sample referred to was bought for a good article of horehound candy, but was found to be highly colored with Eosine. (Sodium Tetra-brom-fluorescin.)

This sample had a fair appearance, but a practiced eye would immediately detect suspicious pre chlorismon viewing the sticks from different directions.

The third lot of samples, examined in February last, was made up of brilliantly colored bits of candy, the colors being as follows:

Red, from Cochinell.
Yellow, from Lead Chromate.
Green, from Lead Chromate and some blue pigment; (query, Prussian Blue?)
Blue; small quantity.
Orange, some organic coloring matter, probably an aniline.

Lead Chromate was the most objectionable substance present, and large pieces of candy colored thereby were prominent in the sample. It was therefore determined to examine quantitatively a portion of this particular yellow candy, and the following data are taken from my laboratory note book.
Lead Poisoning in Gurkha Soldiers in Hong Kong

W. N. C. NASH,‡ M.B., B.Ch.; J. D. ROBINSON,§ H.N.C., A.I.M.L.T.

*British Medical Journal, 1969, 3, 336–337

Summary: Investigation of an outbreak of lead-poisoning in 121 Gurkha soldiers showed that this was due to the contamination of chilli powder (cayenne pepper), a constituent of curry powder, with lead chromate. Comprehensive systems of food sampling are needed in developing communities.

Introduction

Lead-poisoning due to the ingestion of contaminated food or drink is less common than industrial intoxication resulting from inhaled lead dust or fume. Children have been poisoned through eating lead in paint, putty, or soil (Barlrop, 1968), whereas plumbism in adults is usually associated with drinking highly contaminated beer, cider, or water (Monier-Williams, 1949; Ministry of Food, 1954). Lead-contaminated food was the cause of the outbreak of plumbism in 121 Gurkha soldiers described in this paper.

The various spices used to prepare the curry powder were analysed (Table II) and the sample of chilli powder showed the astonishingly high lead level of 10,800 p.p.m. It is thought that whole chilli pods, imported from mainland China, were

in about 19% of patients. An unexpected finding was bilateral limitation of lateral gaze in 60% of patients. Anaemia was the most striking feature, 110 of the 121 patients showing haemoglobin levels of less than 11.4 g./100 ml of blood, of whom 79 had less than 10.1 g./100 ml. Basophilic stippling of red cells was seen in 51% of all cases.

![Incidence of new cases, by days, showing the three phases of the outbreak.](image-url)
1994
Hungary
Paprika - contaminated with lead

Paprika peppers are air dried for up to a year.

Lead Oxide (Red Lead) $\text{Pb}_3\text{O}_4$

Paprika
Market Focus: Tainted Paprika Poisons Hungary's Culinary Pride: Fifty-nine people are arrested in the scandal, which sent 46 to the hospital. The health of the industry is also at stake.

October 11, 1994 | CAROL J. WILLIAMS | TIMES STAFF WRITER

BUDAPEST, Hungary — Greed was the motive. Housewives were the unwitting perpetrators. So far, nearly four dozen diners have become victims, stricken ill by paprika laced with lead-based paint.

The consequences of Europe's latest food-tampering scandal are likely to afflict not just the body but the soul of Hungary, as a nation proud of its culinary culture finds its food under suspicion, and cooks from Sopron to Szeged ponder how they will manage without their signature Hungarian spice.

Since 46 people were poisoned by tainted paprika last month, police have rounded up 60 suspects. Sacks and tins of paprika have been swept from every store shelf, and the government has banned all domestic sales of the spice.

Yet panic has mounted.

"A Hungarian woman simply can't cook without paprika," insisted Anna Horvath, a pensioner who traveled 40 miles by train from an outlying village to get her cache of the capsicum-based, pungent red powder tested for traces of the poisonous paint.

Investigators believe that the perpetrators tried to save time and money by artificially drying ripe peppers instead of allowing them to naturally desiccate, which can take up to a year. Peppers dried too quickly produce a less brilliant red color when ground into spice, food experts say, which likely prompted the tamperers to add the paint agent to improve the looks of their product.
Adulteration of Paprika in Hungary

The following article appeared in Analysis Europa in December 1994. Thanks to Bill Stavropoulos of Amdel Limited for pointing out this article.

The Hungarian Government is desperately trying to restore consumer confidence in one of the country’s most famous products - ground paprika - after large quantities of the popular spice were found to be contaminated with lead oxide.

The scandal stunned all Hungarians and was quickly followed by the arrest of individuals believed to have Mafia links. Government officials believe that, with the help of food analysis, they have the problem fully under control. Professor Erno Pungor, of The Institute for General and Analytical Chemistry in Budapest, says “There has been much embarrassment over the issue.”

“The Hungarian Ministry of Agriculture found that 5.8 per cent of a batch of 3,432 random samples had been adulterated with Pb3O4. Not only did it enhance the colour of the paprika but it also added to the weight, increasing the profit to unscrupulous dealers.”

Unfortunately, the discovery came too late for some. Several people have died through consuming the contaminated paprika and dozens have been taken ill. Nevertheless professor Pungor praised the rapid response of his Government once it became clear there was a problem.

“The Government strictly controls the export of paprika and believes that no contaminated spice has been exported to EU countries or elsewhere.” In recent weeks the same controls that apply to export have been applied internally and it is hoped that all contaminated supplies will be identified and destroyed.

Paprika has always been a much sought after spice - it is used generously in Hungarian goulash - but there is an unpleasant history of adulteration with red lead.

Other tricks include the use of white pepper, curcuma, barium sulphate and even brick powder...
Turmeric: Processing of Turmeric

Turmeric Processing Technology
Botanical name of turmeric is Curcuma longa L. It is an important spice which is used for yellow colour and special flavour. Rhizomes of turmeric are often found in violet yellow colour. Central rhizomes are like tubers and small rhizomes like fingers coming out from the central one. It contains 1.8 to 5.4% curcumin due to this it has yellow colour. Some amount of starch and 2.5 to 7.2% oil is also obtained. It is used in the form of spices for colouration and flavour. In this very form it is used in medicine and cosmetic goods manufacturing. There are two types of turmeric produced in central India. One has solid and dark colour and the other long, soft and light colour.

Processing of Turmeric by Traditional Method
In India, at various places different methods and equipments are used, but basic method is mentioned below in a process flow sheet.

"Middle Crome"

Added To

Turmeric Rhizomes

Colouring
Exporting turmeric is given special colour by mixing yellow so that powder and processed materials can give better look and quality. Cleaning is done by two methods. One is dry colouring and the other wet colouring. In the first process dry powder of yellow colour is sprayed on boiled turmeric and rightly mixed. Powder is known as middle crome. In the wet colouring process its solution is prepared in water which is sprayed on rhizomes and mechanically mixed. After colouring is complete for one week these are dried. Later on these rhizomes are kept in sacks and closed for exporting.

Grinding or Powder Making
Curing of Turmeric

1. The cleaned finger rhizomes are cured by boiling them in an iron pan.
2. The rhizomes are cooked are cooked in water for 2.5 to 3 hours.
3. The rhizomes are boiled in water till a forth comes out and white fumes appear giving out a characteristic odour.
4. The rhizomes become soft and break easily when pressed between the fingers.
5. They are taken out of the pan and spread on a hard ground for sun drying for about one to two weeks.
6. They are stirred 3 to 4 times for uniform drying.
7. Fully dried rhizomes are again cleaned of roots if any and polished.
8. If produce is in small quantity the it is polished by rubbing with hand against the hard ground.
9. If produce is large in quantity polishing is done by using revolving drum.
10. Turmeric powder or ‘middle chrome’ (an artificial dye) is used for giving necessary color and polish to the rhizomes.
Middle Chrome Yellow Pigment Yellow 34
Lead Chromate Pigment for paints and coatings

Price: 2.75 USD
Payment Terms: T/T, L/C, D/P, WU, Paypal
Place of Origin: Zhejiang, China (Mainland)

Product Detail

<table>
<thead>
<tr>
<th>Model No.</th>
<th>MCY-104</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production Capacity</td>
<td>1000 tons/month</td>
</tr>
<tr>
<td>Delivery Date</td>
<td>15 days after PO</td>
</tr>
<tr>
<td>Style</td>
<td>Inorganic</td>
</tr>
<tr>
<td>CAS No.</td>
<td>1344-37-2</td>
</tr>
<tr>
<td>Appearance</td>
<td>Reddish Yellow powder</td>
</tr>
<tr>
<td>Characteristics</td>
<td>excellent light fastness, d...</td>
</tr>
<tr>
<td>H.S. Code</td>
<td>32062000</td>
</tr>
<tr>
<td>Qty/PLT</td>
<td>1250 kg</td>
</tr>
<tr>
<td>Chemical Class</td>
<td>Lead Chromate</td>
</tr>
</tbody>
</table>

Means of Transport: Ocean, Land, Air
Packing: 25 kg bag with pallets
Type: Chromium
Brand Name: Epsilonchem
Purity: 99%
C.I. No.: 77600
Color Index: Pigment Yellow 34
Package: 25 KG BAG
Qty/20GP: 25000 kg
EINECS NO.: 215-693-7

1. Reddish Yellow powder
2. Recommended for paints and coatings
3. Excellent light fastness, durability, stability, performance and dispersibility

Chrome Yellow is lead chromate (PbCrO4). It had been commonly produced by mixing solutions of lead nitrate and potassium chromate and filtering off the lead chromate precipitate.
Lead Chromate

Lead(II) chromate
From Wikipedia, the free encyclopedia

Lead(II) chromate (PbCrO$_4$) is a chemical compound, a chromate of lead. It has a vivid yellow color and is insoluble in water, and as a result, is used in paints under the name chrome yellow.

Applications

Approximately 37,000 tons were produced in 1996. The main applications are as a pigment in paints. It has also been used in the paint to color school buses.
Lead Chromate

Processed Whole Turmeric Rhizomes
Archer Farms Turmeric

Class I Recall

“Excessive Lead levels”

Lead concentrations not given
ANNEX A

CHROMATE TEST

[Table 1, Sl. No. (vi), Col 6]

A-1 REAGENT

A-1.1

Dilute Sulphuric Acid—1:7 (v/v).

A-1.2

Diphenyl Carbazide Solution—0.2 percent (m/v) in ethyl alcohol [95 percent (v/v)].

A-2 PROCEDURE

Ash about 2 g of the material. Dissolve the ash in 4 to 5 ml of dilute sulphuric acid in a test-tube and add 1 ml of diphenyl carbazide solution. The presence of chromate is indicated by the production of violet colour.
## PRAN Brand Spice Powder Turmeric

### Class I Recall - Elevated Levels of Lead

<table>
<thead>
<tr>
<th>Recall Date</th>
<th>Distributor</th>
<th>Lead</th>
</tr>
</thead>
<tbody>
<tr>
<td>October 3, 2013</td>
<td>OnTime Distribution Inc.</td>
<td>28 – 42 ppm</td>
</tr>
<tr>
<td>October 8, 2013</td>
<td>Asia Cash &amp; Carry Inc.</td>
<td>28 ppm</td>
</tr>
<tr>
<td>October 15, 2013</td>
<td>Best Value, Inc.</td>
<td>53 ppm</td>
</tr>
<tr>
<td>October 17, 2013</td>
<td>Fahman Enterprises Inc.</td>
<td>48 ppm</td>
</tr>
</tbody>
</table>
One illness complaint has been received to date.

The recall was initiated after it was discovered that product contained high levels of lead based on sampling by New York State Health Department and private laboratory testing.

Consumers who have purchased PRAN brand Spice Powder TURMERIC are urged not to consume the product and should return it to the place of purchase for a full refund. Consumers with questions may contact the company at 1-718-417-1100, Monday – Friday, 9 am – 5 pm ET.
FDA Cracks Down on Imported Spices After Turmeric Tests Positive for Lead

October 23, 2013
By ABC NEWS via GOOD MORNING AMERICA
Class I recall: a situation in which there is a reasonable probability that the use of or exposure to a violative product will cause serious adverse health consequences or death.

Class II recall: a situation in which use of or exposure to a violative product may cause temporary or medically reversible adverse health consequences or where the probability of serious adverse health consequences is remote.

http://www.fda.gov/Safety/Recalls/ucm165546.htm
Turmeric Powder

Retail market
Albany, New York

Received at Lab: March 14, 2014

Completed by lab: March 31, 2014

Origin: Bangladesh
(FBD Distributors)

Contains:

Lead = 52.8 ppm
Chromium = 10.3 ppm

Chromate Test = positive
(Indian Standard 3576 : 2010)

(Therefore contains Lead Chromate)
Turmeric Powder

Retail market
Albany, New York

Received at Lab: March 14, 2014

Completed by lab: March 31, 2014

Origin: Bangladesh
(Southern Foods USA Inc.)

Contains:

Lead = 146.0 ppm
Chromium = 30.0 ppm

Chromate Test = positive
(Indian Standard 3576 : 2010)

(Therefore contains Lead Chromate)
Population Effects of Turmeric Consumption on Pediatric Blood Lead Levels
Whitney Cowell¹, Donna Vorhees¹, Thomas Ireland², Wendy Heiger-Bernays¹
¹Department of Environmental Health, Boston University School of Public Health, ²Boston University School of Arts & Sciences

**Prior Evidence**
- Identification of Pb chromate, a potential adulterant, at turmeric manufacturing plants in India (source of 97% of US turmeric)
- Recalls of 4 US turmeric brands due to "excessive" Pb levels (Spice Hunter, Archer Farms, Pran, Dr. Clark Supplement)
- Reports of Pb poisoning following spice consumption from 4 health depts. across the US (AZ, CO, CT, CA)
- Identification of spices as the source of Pb exposure in case reports of clinical lead poisoning among children, adults and pregnant women.

**Methods**

**Sample Collection:** We purchased 64 unique brands of turmeric from 48 stores in the Boston metropolitan area and randomly selected 50% for Pb analysis (n=32).

**Chemical Analysis:** We analyzed all samples for Pb using ICP-MS and determined *in vitro* Pb bioaccessibility (IVBA) and Pb relative bioavailability (RBA) for a randomly selected subsample (n=10) using a simple bioaccessibility extraction test (SBET).

**Exposure Assessment:** We estimated a range of Pb intake from turmeric consumption by searching the web for "turmeric recipes" and recording the volume used per serving. We halved the serving size for children 1-4 years.

**Exposure Model:** We used @Risk6.0 to fit empirical distribution functions (EDFs) for our Pb (µg/g) & turmeric (g) ingestion data and conducted a one-dimensional Monte Carlo analysis to describe the population distribution of Pb exposure from turmeric consumption.

**Risk Characterization:** We input percentiles of Pb intake estimated from our exposure model into the EPA’s Integrated Exposure Uptake Biokinetic Model (IEUBK) to predict changes in children’s BLLs. We modified the default bioavailability to reflect our data from the SBET test.

**Results**

**Summary Statistics for Lead Concentration, Turmeric Consumption, and Bioaccessibility Data**

<table>
<thead>
<tr>
<th>Pb Conc. (µg/g)</th>
<th>N</th>
<th>Mean (SD)</th>
<th>50th</th>
<th>95th</th>
<th>99th</th>
<th>100th</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>32</td>
<td>4.42 (18.39)</td>
<td>0.12</td>
<td>34.78</td>
<td>99.50</td>
<td></td>
</tr>
</tbody>
</table>

**Turmeric Intake (g/serv)**
- 1-4 yrs: 100, Pb dose 0.33 (0.33), Pb conc. 0.22, RBA 1.95
- 5-7 yrs: 100, Pb dose 0.66 (0.67), Pb conc. 0.43, RBA 3.90

**IVBA (%)**
- 10, Pb dose 69.97 (15.06), Pb conc. 65.75, RBA 99.80, RBA 99.80

*50,000 iterations was sufficient to achieve model stability.
*To estimate RBA we used the following model: RBA = 0.875 IVBA - 0.028. To estimate absolute bioavailability (ABA) from RBA we assumed 50% of soluble lead is absorbed in food and water from the child’s GI tract.

We found two samples with extremely elevated concentrations:
1. ACI Pure: 99.5 µg/g
2. Pran: 34.8 µg/g
Both were imported from Bangladesh where the permissible level is 2.3 ppm. Using our mean intake, we estimate that a single 400g bag of ACI Pure would last for 2 years when consumed by a child on a daily basis.

**Conclusion**
Use of turmeric for food preparation is unlikely to substantially increase BLLs; however, intentional adulteration of spice samples with high concentrations of Pb warrants further investigation.

**Next Steps**
Our next steps include investigation of additional pathways of turmeric consumption, such as supplements and beverages, which we have found to contain up to 18.3 g of turmeric.
“Using our mean intake, we estimate that a single 400 g. bag of Aci pure (turmeric) will last 2 years when consumed by a child on a daily basis.”

400 grams ÷ 730 days = about ½ gram per day

In the Code of Federal Regulations (CFR) Title 21, the serving size per meal for spice is referenced as ½ gram.

Investigations Of Heavy Metals In Commercial Spices Brands

Hifsa Mubeen, Ismat Naeem*, Abida Taskeen and Zeb Saddiqe.

Lahore College for Women University, Lahore
Jail Road Lahore, Pakistan.
Tel: 92-42-9203801-9/245
Email: ismat4_naeem@yahoo.co.in

Abstract: In present study concentrations of some heavy metals such as iron(Fe), copper(Cu), chromium(Cr), lead(Pb), cadmium(Cd) and cobalt (Co) present in common spices of two brands widely used in Pakistan coded as A & B were determined using atomic absorption spectroscopy. The studies showed differences in metal concentrations in different spices samples. The concentration of Fe ranged from 144.5 to 1260 mgkg⁻¹ on dry weight basis, where as that of Cu was ranged from 9 to 44 mgkg⁻¹ to 3.05 mg kg⁻¹. The concentration level of Cr was from 115 to368 mg kg⁻¹. Concentration of Co and Cd blanks were also introduced. Results reported are average of duplicates.

The daily intake (mgkg⁻¹day⁻¹) was calculated based on these suppose
1) The human weight is 50 kg and
2) The human intake from spices per day is 20 g.

The daily intake (mgkg⁻¹day⁻¹) = metal concentration in spice × 20/1000 / 50  (Eq.1)

Results and Discussion:
“Using our mean intake, we estimate that a single 400 g. bag of turmeric will last 2 years when consumed by a child on a daily basis.”

400 grams ÷ 730 days = about ½ gram per day

According to the reference from the Pakistani study...

“The daily intake ... was calculated based on these suppose

The human weight is 50 kg (110 lb.) and
The human intake from spices per day 20 g.”

So therefore, a 55 lb. child could consume **10 g. per day of spices.**
Goya Jamaican Curry powder

10 g. per day of spices =

3 to 4 grams per day of turmeric.
Lead exposure

About 310,000 U.S. children ages 1 to 5 have elevated blood lead levels, which can accumulate over months and years and cause serious health problems.

Effects on children

- Kids absorb up to 70 percent of lead, adults about 20 percent
- Often undetected; no obvious symptoms
- Can lead to learning disabilities, behavioral problems, malformed bones, slow growth
- Very high levels can cause seizures, coma, death

Sources

- Lead-based paint, contaminated dust in homes built before 1978
- Drinking water from lead pipes
- Contaminated food
- Soil (lead does not biodegrade, decay)
- Toys*

What parents can do

- Have child screened if there is concern of lead exposure
- Frequently wash child’s hands, toys, pacifiers
- Only use cold tap water for drinking, cooking
- Test paint, dust in home if it was built before 1978

*Old toys with lead paint a known risk, but new toys from China now have come under scrutiny

Source: U.S. Centers for Disease Control and Prevention, U.S. Department of Health and Human Services
Lead in Spices

Colorado Environmental Health Association
September 28, 2011

Michele Kinshella, M.S., CIH
Tom Butts, MSc, REHS, RHSP

Tri-County Health Department
# Interpretation of Lead Levels in Children and Recommended Actions

<table>
<thead>
<tr>
<th>Venous Confirmed BLL (μg/dL)</th>
<th>Interpretation for Children Under Age 6</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Below 10</td>
<td>Not lead poisoned</td>
<td>No action</td>
</tr>
<tr>
<td>10-14</td>
<td>Some exposure to lead</td>
<td>Community intervention activities</td>
</tr>
<tr>
<td>15-19</td>
<td>Elevated blood lead level</td>
<td>Confirm with 2&lt;sup&gt;nd&lt;/sup&gt; BLL test. Case management, including nutritional and educational intervention; more frequent screenings. If level persists, environmental inspection and remediation.</td>
</tr>
</tbody>
</table>
| **20-44**                   | **Lead poisoned**                      | Environmental investigation and remediation  
Medical check-up |
| Above 45                    | Seriously lead poisoned                | Medical check-up and treatment |
Case 1

- January 2010, received notice of 20-month old
  - BLL = 15.3 μg/dL on 10/13/09
  - BLL = 25.2 μg/dL on 11/20/09
- Lead Poisoned
- Family lived in Aurora apartment for previous 7 months
- Prior to living in Aurora, family lived in Nepal refugee camp
- Mother speaks Nepali; father speaks some English
- 1/4/10 conducted environmental assessment of apartment
Case 1 Sources Found

- White pitcher
- Ceramic tile
Case 1 Follow-up

- 6/11/10 — Received call from case’s doctor at Lowry Refugee Clinic
- Case’s BLL rose from 21 µg/dL to 31 µg/dL
- Doctor requested TCHD re-visit home to look for additional sources
Curry Spice

- Case’s mother ground various dried plants purchased from nearby ethnic grocery store to make curry powder
- Curry measured 29.2 ppm lead
- Lead standard for curry?
  - FDA maximum recommended standard of 0.1 ppm lead in candy
Case 2

- August 2010, received notice of 15-month old
  - BLL = 10.1 μg/dL on 8/4/10
  - BLL = 24 μg/dL on 11/3/10
- Child born in U.S.
- Educated parents; father worked in IT, both spoke English well
- Family had recently been in India for 2.5 months
- 11/15/10 conducted environmental assessment of apartment
- Parents had elevated lead levels
Case 2 Sources Found

- Various spices
  - Chile powder—368.8 ppm
  - Turmeric—211.2 ppm
  - Coriander powder—2.4 ppm
  - Garam masala —1.4 ppm

- Red vase
Grocery Store Sampling

- Using XRF, screened TCHD staff spices for lead
- Screening levels ranged from 44 to 50 +/- 8 ppm lead in San Francisco Herb & Natural Food Co. turmeric
- Elevated lead levels confirmed by lab
Epidemiologic Characteristics of Children with Blood Lead Levels ≥45μg/dL

Brett Keller, Andrew Faciano MPH, Adey Tsegag MPH, Jacqueline Ehrlich, MD, MPH
Healthy Homes Program /Lead Poisoning Prevention
New York City Department of Health and Mental Hygiene
Of 96 products tested, 12 had ≥ 10ppm lead

- 3 surma samples all had high lead levels (1.4%, 22%, and 25%)
- Cough remedy powder purchased in Russia (750,000ppm or 75%)
- Abdominal discomfort remedy made in South Korea (8,075ppm)
- Chapulinas (dried, spiced grasshoppers) from Mexico (2,900ppm)
- 2 turmeric samples from Bangladesh (1,424 & 2,000ppm)
- Cassava grain from Nigeria (38ppm)
- Ingested incense ash from Gambia (31ppm)
- Yellow metal toy car from China which a child mouthed (19ppm)
- Chili powder from Bangladesh (12ppm)
16C-2781
Jamaican Curry Powder

Origin Unknown

Sampled at a retail market in Brooklyn, New York

Received at Lab
July 5, 2016

Lead = 35.0 ppm
Chromium = 9.76 ppm

Chromate Test
(Indian Standard 3576:2010)
POSITIVE

Therefore, high lead is a result of use of lead chromate (PbCrO$_4$), a yellow pigment.

Lead chromate contains hexavalent chromium which is the more toxic form of chromium.
Food Safety Alert

July 22, 2016

Jola Szubielski 518-457-0752
Dave Bullard 315-487-7711 x 1377

Consumer Alert: Elevated Lead Levels in “Jamaican Curry Powder”

New York State Department of Agriculture and Markets Commissioner Richard A. Ball today alerted consumers to a concern for elevated levels of lead in Blue Mountain brand “Jamaican Curry Powder,” packaged and distributed by Eve Sales Corporation located at 945 Close Ave, Bronx, New York. No illnesses have been reported to date in connection with this product.

The recalled “Jamaican Curry Powder” is packaged in a 6 ounce glass jar. It has a code of B/B 06/03/19 OPC LOT #060116 on the bottom of the container. The package also has a UPC code of 09349-19906. The product was distributed throughout the United States.

Routine sampling by New York State Department of Agriculture and Markets’ food inspectors and subsequent analysis of the product by the New York State Food Laboratory revealed the elevated level of lead.

Lead at elevated levels, if consumed, may cause health problems to consumers, particularly infants, small children, pregnant women, and those with underlying kidney disorders. If a child or a pregnant woman is exposed to lead for a prolonged period of time, permanent damage to the central nervous system, learning disorders, developmental defects, and other long-term health problems can occur. Pregnant women, children and patients with underlying kidney problems who may have consumed any of the above products should consult with their physician or health care provider.

Consumers who have purchased “Jamaican Curry Powder” should discard the product. Consumers with questions about the recalled product may contact Stewart Gayle at (718) 589-
Further testing: early August 2016

<table>
<thead>
<tr>
<th>Lab #</th>
<th>Chromate</th>
<th>Lead</th>
<th>Chromium</th>
</tr>
</thead>
<tbody>
<tr>
<td>16C-3166</td>
<td>Positive</td>
<td>18.6 ppm</td>
<td>4.95 ppm</td>
</tr>
<tr>
<td>16C-3167</td>
<td>Positive</td>
<td>22.6 ppm</td>
<td>6.20 ppm</td>
</tr>
<tr>
<td>16C-3168</td>
<td>Negative</td>
<td>49.1 ppb</td>
<td>None found</td>
</tr>
<tr>
<td>16C-3169</td>
<td>Positive</td>
<td>21.5 ppm</td>
<td>6.10 ppm</td>
</tr>
</tbody>
</table>
Oriental Packing Co., Inc. Issues Alert on Lead in Curry Powder

For Immediate Release
August 12, 2016

Contact
Consumers
Oriental Packing Company
800-609-9793

Announcement
Oriental Packing Co., Inc., Miami, Florida is recalling approximately 377,000 lbs. of the following blended seasoning curry products because it is contaminated with lead. Lead can accumulate in the body over time and can cause serious and sometimes permanent adverse health consequences.

Blue Mountain Brand
- Blue Mountain Country Mild Curry Powder
- Blue Mountain Country Hot Curry Powder
- Blue Mountain Country Hot Jamaican Jerk Curry Seasoning

Jamaica Choice Brand
- Jamaica Choice Mild
Turmeric powder

Received at Lab
December 2015

Retail market
Rome, New York

Origin: Unknown

Contains:

Lead = 3.33 ppm

by
ICP-MS
16C-2916
Ground Turmeric

Origin Unknown

Sampled at a retail market in Hudson, New York

Received at Lab on July 14, 2016

Lead = 54.1 ppm
Chromium = 16.9 ppm

Chromate Test
(Indian Standard 3576:2010)
POSITIVE

Therefore, high lead is a result of use of lead chromate (PbCrO₄), a yellow pigment.

Lead chromate contains hexavalent chromium which is the more toxic form of chromium.
Food Safety Alert

July 27, 2016

Jola Szubielski 518-457-0752
Dave Bullard 315-487-7711 x 1377

Gel Spice, Inc. Issues Alert on Elevated Lead Levels in One Lot of Fresh Finds Ground Turmeric Powder

Gel Spice, Inc. is recalling one lot of Fresh Finds Ground Turmeric Powder because the product contains elevated lead levels.

The recalled “Fresh Finds Ground Turmeric” is packaged in 3.75 oz. PET jars. It has a code of B/B 03/08/19 and B/B 05/18/19 on the neck of the container. The package also has a UPC code of 81026-01230. The product was distributed at Big Lots Stores throughout the United States.

Routine sampling by New York State Department of Agriculture and Markets’ food inspectors and subsequent analysis of the product by the New York State Food Laboratory revealed the elevated level of lead.

No illnesses have been reported to date in connection with this problem.

Lead can accumulate in the body over time. Too much can cause health problems, including delayed mental and physical development and learning deficiencies. Pregnant women, infants and young children especially should avoid exposure to lead. People concerned about blood lead levels should contact their physician or health clinic to ask about testing.

Consumers who have purchased “Fresh Finds Ground Turmeric” should discard the product. Consumers with questions about the recalled product may call (201)564-0435.

Photo
Update: Gel Spice, Inc. Issues Expanded Recall of Ground Turmeric Powder Due to Elevated Lead Levels
Recalling Firm: Gel Spice Co, Inc.
48 Hook Rd
Bayonne, NJ 07002-5007
United States

Reason for Recall: Ground Turmeric may contain excess levels of lead.

Classification: Class I

Product Quantity: 34,712 pounds total for all recalled products
16C-3600
Turmeric Powder

Origin Unknown

Sampled at a retail market in Brooklyn, New York

Received at Lab on August 24, 1016

Lead = 15.8 ppm
Chromium = 5.02 ppm

Chromate Test
(Indian Standard 3576:2010)
POSITIVE

Therefore, high lead is a result of use of lead chromate (PbCrO$_4$), a yellow pigment.

Lead chromate contains hexavalent chromium which is the more toxic form of chromium.
92 turmeric samples, 2013 to present
Lead in ppm

- 51 samples with lead levels between 0.0 and 0.2 ppm
- 19 samples with lead levels between 0.2 and 0.4 ppm
- 8 samples with lead levels between 0.4 and 0.6 ppm
- 5 samples with lead levels between 1.0 and 3.0 ppm
- 3 samples with lead levels between 3.0 and 25 ppm
- 4 samples with lead levels over 25 ppm

Note: The categories > 0.4 - 0.6, > 0.6 - 0.8, > 0.8 - 1.0, > 1.0 - 3.0, > 3.0 - 25, and over 25 are not explicitly labeled in the diagram.
March 17, 2017

US FDA Class 1 Recall
(State of Illinois)

**Za’ atar**

Nabelsi brand “Thyme”

Ingredients:

Thyme, Sumac, Roasted Sesame Seeds, Oregano, Cumin, Caraway seeds and Coriander

“...two cases of high blood levels of lead...”

“...product contained high levels of lead (422 PPM)...”
Special Thanks to:

NYS Agriculture & Markets
Division of Food Safety & Inspection

Michele Kinshella
Tri-County Health Denver

New York City
Department of Health
And Mental Hygiene