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**TO:**

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Comments: THE ARTICLE IS ONLY ONE PAGE LONG. I'VE ADDED  
A REPORT FROM AN INVESTIGATION WE DID IN 1990. I THOUGHT  
YOU MIGHT BE INTERESTED BECAUSE OF SIMILARITIES TO  
THE OTHER CASE.

CF

## ACUTE PNEUMONITIS DUE TO ACCIDENTAL EXPOSURE TO MERCURY VAJOR

George W. King, M.D.  
Tucson, Arizona

**M**EDICAL literature on mercury poisoning commonly refers to the acute or chronic effects of a mercury salt on the various tissues of the body, usually the kidney, or of the toxic and physiological effects of diuretic, antihelminthic or other organic mercury containing compounds on the body. Acute and chronic poisoning from metallic mercury usually occurs in industry where it has been found among workers in quicksilver mines, in industries extracting other metals with the use of mercury, among makers of felt hats, mirrors, scientific instruments etc. The physical characteristics of metallic mercury make it especially dangerous in these industries, since it is slightly volatile at ordinary temperatures, and it boils at 356.99C. Due to volatility it is readily absorbed by inhalation of its fumes (von Ottingen), and these small particles of mercury are extremely powerful protoplasmic poisons. The following is a case of accidental exposure to mercury vapor in which the inhaled chemical set up an acute pneumonitis, and in which prompt vigorous treatment effected complete recovery.

**Case Report:** D. L., a 29 year old amateur prospector stated that on February 21, 1954 he mixed about one ounce of "gold sand" with about one teaspoonfull of metallic mercury and heated the resulting amalgam in a clay dish over the kitchen stove with the intention of evaporating the mercury and recovering the pure gold. The kitchen was described as measuring about 10 by 10 feet with ventilation provided by a partially open door leading to the outside. Both the patient and his wife were in the kitchen for most of the hour that it took to reduce the mercury amalgam to a small black residue, and they both noticed a metallic taste which they attributed to the burning paint on the clay dish. About one hour later the patient lit a cigarette, and was seized with a sudden fit of coughing that lasted for several hours, until a physician was summoned.

When first examined the patient was found to be acutely ill, vomiting, febrile, slightly cyanotic and very dyspneic. He was unable to take a deep breath due to a severe burning oppressive pain over the trachea and anterior

chest. A portable chest x-ray taken on admission to the hospital revealed, "Bilateral bronchopulmonary abnormality probably indicative of aspiration and exudative type bronchitis". A standard chest x-ray taken two days later showed, "Improvement is obvious, but active appearing infiltration due to the chemical pneumonitis is still present bilaterally." Other laboratory tests with the exception of a white blood count of 12,000 and a marked shift to the left were within normal limits. The urine at no time showed albumen, pus or blood, and one determination for heavy metal content was negative.

The patient was placed in an oxygen tent and started on dimercaprol (BAL) in peanut oil, 2 cc every four hours for the first day, and then every eight hours for the second day. He was placed on penicillin and dihydrostreptomycin by injection, and then tetracycline 250 mgm. every six hours as soon as his vomiting stopped. Allevaire® was added to the oxygen inhalations, and positive pressure oxygen with the Bennett valve seemed to give him relief.

The patient became afebrile on the 4th hospital day, and was discharged on the 10th hospital day. He was re-hospitalized 5 days later with an acute coughing paroxysm that could not be controlled at home, but x-rays at that time showed complete clearing of the pneumonic process and he was discharged the next day. At the final examination the patient was found to be entirely well, with a vital capacity of 100%. Urine examination was entirely negative.

### SUMMARY

An interesting case of acute pneumonitis apparently due to accidental exposure to mercury vapor in the home has been presented. The manner of treatment is described with the patient making a complete recovery. The warning implied by this case as to the improper handling of mercury seems clear.

From the Department of Medicine, Tucson Clinic, 110 S. Scott

### REFERENCES

- "Poisoning", W. F. von Ottingen, M.D., Ph.D. Paul B. Hoeber, Inc. p. 385, 1952.
- Tucker Howard, M.D. Practice of Medicine, TICE, Vol. VIII, P. 173, 1952.
- The Pharmacological Basis of Therapeutics, Goodman and Gilman. The Macmillan Co., P. 732, 1940.

~~CONFIDENTIAL~~

## ARIZONA DEPARTMENT OF HEALTH SERVICES

## Inter-Office Memorandum

TO: File DATE: Dec. 11, 1990

THRU: Don Selvey, Manager *DS*  
Investigation and Surveillance Section (ISS)

FROM: Marie Hatch, Epidemiologist *MH*  
ISS

RE: Yuma - Mercury Poisoning

## SUMMARY

On Nov. 9, 1990, Katie Hurlbut, M.D. reported an isolated mercury poisoning case in Yuma, Arizona, which had occurred following home gold ore processing. The patient, \_\_\_\_\_, had completed one regimen of chelation therapy. Because blood mercury levels remained high, Dr. Hurlbut was concerned Ms. \_\_\_\_\_ was exposed to a continued reservoir of mercury. She requested ADHS investigate the home interior to determine whether such a reservoir did exist in the home.

Using detection equipment borrowed from U.S. Occupational Health and Safety Administration (OSHA), Phoenix Office, we conducted a thorough evaluation of Ms. \_\_\_\_\_ residence, but found no substantial levels of mercury.

## INTRODUCTION

On Oct. 5, 1990, at approximately 6:00 p.m., Ms. \_\_\_\_\_ inhaled mercury vapors while conducting a gold ore extraction process in her mobile home in Yuma. Ms. \_\_\_\_\_ was diagnosed with acute mercury poisoning at the University Medical Center (UMC) in Tucson on October 9. She was started on Dimercaprol Sulphonic Acid (DMCSA) for chelation at that time. On Nov. 9, Ms. \_\_\_\_\_ called ORAI to request our assistance in evaluating her home for reservoirs of mercury. Her physician confirmed the poisoning and also requested an evaluation of Ms. \_\_\_\_\_'s home. An investigation was initiated on that date.

Background

a resident of Yuma, dry washes for gold in the desert as a hobby.

According to Ms. \_\_\_\_\_, raw gold must be processed to separate the gold from the ore. Traditionally, gold panners use elemental mercury to burn off the ore. The extraction process is considered safe when performed outside over an open fire. Ms. \_\_\_\_\_ says she had been told to do this process outdoors, in order for the mercury vapors to dissipate. However, she claimed to have processed gold ore in her home two and one-half years ago without any adverse health effects.

### Incident

On Oct. 5, \_\_\_\_\_ cooked a dime size amount of mercury with gold ore in a cast-iron ladle over her kitchen stove. According to Ms. \_\_\_\_\_, the procedure took ten minutes. She claims to have had the kitchen window open on one side of the room, a fan blowing on the opposite side, and the stove exhaust fan on in her mobile home. She claims to have immediately experienced nausea, headache, lethargy and sore mouth. Within the hour, her two small house dogs began to vomit. Ms. \_\_\_\_\_ went out for dinner shortly thereafter, returning about 9:00 p.m. because she did not feel well. Upon her return, she found the dogs had vomited several times more. Later in the evening, and several times through the night, she also experienced emesis. The morning of Oct. 6, after vomiting blood, she reported to the emergency room of Yuma Regional Hospital. She told the emergency room physician she had mercury poisoning; however, according to Ms. \_\_\_\_\_, the physician did not reach the same conclusion. A blood test, only, was performed at that time. Three days later, Ms. \_\_\_\_\_ saw her dentist because of swollen, purple gums and blisters inside her mouth. The dentist recognized these symptoms as consistent with mercury poisoning and referred her to poison control at UMC.

Ms. \_\_\_\_\_ was seen at UMC by Katie Hurlbut, M.D., who diagnosed acute mercury poisoning. She prescribed oral DMCSA for chelation. After three weeks of chelation therapy Ms. \_\_\_\_\_ was re-evaluated and tests indicated a mercury blood level of 193 milligrams of mercury per deciliter (mg/dl) of blood. The normal adult body can tolerate up to 50 mg/dl. Dr. Hurlbut suggested Ms. \_\_\_\_\_ contact ADHS for assistance in detecting a continuing source of mercury vapor.

### INVESTIGATION

Following the initial telephone conversation with Ms. \_\_\_\_\_ on November 9, Don Selvey consulted with Dr. Hurlbut, who confirmed the illness and requested an investigation be initiated by ADHS.

Mark van Ert, Ph.D., a professor of Industrial Hygiene at the University of Arizona was contacted. He recommended using a Jerome Mercury Vapor Analyzer, also known as a mercury sniffer, because it is more sensitive in detecting mercury levels in the ambient air than other methods of testing. Dr. van Ert also recommended ventilating the house by turning the heat on for approximately one hour, followed by complete ventilation. He suggested repeating the process several times. He also encouraged heating the house prior to obtaining readings from the mercury sniffer.

On Nov. 15, the Jerome Mercury Vapor Analyzer was obtained from Bob Scoglio, Industrial Hygienist at OSHA. Cecile Fowler and Marie Hatch traveled to Yuma and tested the interior of Ms. \_\_\_\_\_'s home for reservoirs of mercury. During the course of one hour on November 15, a total of 26 samples were taken with the Mercury Sniffer. At this time, a medical release form was also signed by Ms. \_\_\_\_\_.

## FINDINGS

Of the 26 samples taken with the mercury sniffer, three were significant. A reading of 0.053 milligrams per cubic meter ( $\text{mg}/\text{m}^3$ ) was recorded inside the plastic, zip-lock bag containing the bottle of mercury. A reading of 0.004 was obtained from the bottle of Mercury outside the bag. The bottle of mercury was checked, and found to have a tight seal--thus indicating no vapors should be escaping. A reading of 0.019 was obtained from the spoon used to handle the mercury (removed from the same bag containing the mercury bottle.) All other readings were  $<0.004$  (11 at 0.000). The average of these other readings was  $0.00083 \text{ mg}/\text{m}^3$ .

Ms. \_\_\_\_\_ appeared to be in good health. She did, however, complain of three loose teeth which she contributed to the mercury poisoning.

## DISCUSSION AND CONCLUSION

There are three valence states of mercury: organic, inorganic, and elemental. Elemental mercury is the state usually found in the form of mercury vapor. Ambient air generally averages 0.00001 to 0.00002 milligrams per cubic meter ( $\text{mg}/\text{m}^3$ ) (1). According to the Environmental Protection Agency (EPA), the threshold value for mercury vapor in ambient air during each 24 hour period is  $0.001 \text{ mg}/\text{m}^3$ . Exposure to levels as low as  $0.003 \text{ mg}/\text{m}^3$  over a period of several years have been linked with chronic mercury toxicity (2). The three highest readings found in Madeline George's home were low, but higher than the limits set by EPA. However, these readings were found associated with the bag of mercury and access to ambient air is unlikely. When these three readings are eliminated, the average of all other readings are below the level of concern. No known adverse health effects are known to be associated with levels of Mercury Vapor below  $0.001 \text{ mg}/\text{m}^3$ .

Even though few studies have been conducted, the biological half-life for elemental mercury "appears" to be 35-90 days (3). The levels of mercury found in the home of Ms. \_\_\_\_\_ were recorded 41 days following the gold ore processing. This indicates current levels of mercury vapor in Ms. \_\_\_\_\_'s home should continue to dissipate with time.

A control reading of ambient air was taken at OSHA offices; no mercury vapor was detected. Actual readings of mercury in the ambient air usually show up at levels of  $10^{-5}$ ; however, the Jerome Mercury Vapor Analyzer is only sensitive enough to measure at  $10^{-3}$ . Regardless, the levels of mercury vapor found in Ms. \_\_\_\_\_'s home can not be considered

significant. Dr. Hurlbut and Ms. have been notified of the results and our conclusion.

## REFERENCES

1. Rogozen, Michael, and Hausknecht, Donald. "Health Effects of Mercury and Its Compounds." Research Project 859-1, Prepared by Science Applications, Inc., Los Angeles, California, (1978) 57.
2. U.S. Public Health Service, Agency For Toxic Substances and Disease Registry. Toxicology Profile For Mercury, Prepared by Clement Associates, (1989) 3, 109.
3. Klaassen, C.D., Amdur, M.O., Doull, J. "Casarett and Doull's Toxicology." Third Edition, MacMillan Publishing Company, New York, New York, (1986) 606.

Sample Readings of Ambient Air  
From Jerome Mercury Vapor Analyzer  
Yuma Mercury Poisoning - Home Interior  
November 15, 1990

LOCATION	SAMPLE READING
<b>KITCHEN:</b>	
1) Cast iron ladle (Mercury cooking ladle)	.002
2) Cast iron utensils	.000
3) Stove exhaust fan	.001
4) Stove exhaust pipe	.001
5) Low side of stove	.000
6) Stove side on floor	.000
7) Under stove burner	.000
8) Cupboard under sink (bag of Mercury stored)	.000
9) Kitchen drapes	.000
10) <i>Bag of Mercury and supplies</i>	.053*
11) <i>Mercury bottle</i>	.004*
12) <i>Spoon to handle Mercury</i>	.019*
<b>LIVING ROOM:</b>	
13) Big chair	.001
14) Carpet under big chair	.003
15) Ambient air above big chair	.000
16) Ambient air above couch	.000
17) Carpet under couch	.000
<b>BATHROOM:</b>	
18) Ambient air (1)	.002
19) Ambient air (2)	.003
20) Above counter	.002
21) Wall above switch	.000
22) Shower	.001
<b>BEDROOM:</b>	
23) Ambient air	.002
24) Rug at side of bed	.000
25) Bed	.000
<b>HALL:</b>	
26) Cleaning supplies	.002
<b>AVERAGE OF READINGS</b>	<b>.00083</b>

\* Items excluded from Average of Readings

MDH/kw

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