Final Report Addendum

Metals Screening
Freeport, Brazoria County, Texas

September 10, 2013

TEXAS Department of State Health Services

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Summary

The Texas Commission on Environmental Quality (TCEQ) asked the Texas Department of State Health Services (DSHS) to help investigate possible exposures to metals in Freeport, Texas. In January 2013, DSHS released a report summarizing the results of urine samples collected from 353 residents living in the area of interest. Approximately one-third of the people tested in the May and August 2012 screenings had urinary nickel levels higher than normal. In April 2013, additional nickel testing was offered to those people with higher than normal nickel levels. The results from the 67 samples collected in April 2013 indicated that very few people continued to have elevated nickel levels.

Purpose and Health Issues

The Texas Commission on Environmental Quality (TCEQ) asked the Texas Department of State Health Services (DSHS), Environmental and Injury Epidemiology and Toxicology Unit (EIET), to help investigate possible exposures to metals in Freeport, Texas. Based upon the results from the May and August 2012 metals screenings, it was determined that additional nickel testing was necessary. The results of the follow-up nickel testing conducted in April 2013 are presented in this addendum to the January 2013 Final Report [1]. A full list of the acronyms and abbreviations used in this report are included in the Appendix.

Background

In January 2013, DSHS released a report [1] summarizing the results of urine samples collected from 353 residents living in the area of interest. Most people tested during the May and August 2012 metals screenings had urinary cobalt and molybdenum levels consistent with those seen in the United States (US) general population. However, approximately one-third of the people tested had urinary nickel levels higher than normal. In April 2013, additional nickel testing was offered to those people with higher than normal nickel levels to determine if there was continued exposure to nickel.

Biological Screening

Letters were mailed to people with higher than normal nickel test results from the May and August 2012 screenings to offer them additional nickel testing. The follow-up nickel testing was conducted April 14 through 17, 2013.

Each participant signed an informed consent form outlining: the purpose of the testing; the procedures involved; the expected time commitment; any reasonably foreseeable risks or discomforts; potential benefits to the participant or to others; how their information would be kept confidential; and who they could contact with any questions or concerns regarding the consent form or the specimen collection procedures.

Individual urine test results and an explanation of those results were mailed to each participant.

Urine Sampling

Participants were provided a specimen collection cup with instructions to collect the first morning void urine sample. Samples were collected by DSHS staff from each participant. Urine samples were shipped to the Centers for Disease Control and Prevention (CDC), National Center for Environmental Health (NCEH), and analyzed for nickel using inductively coupled plasma-universal cell technology-mass spectrometer (ICP-UCT-MS) in kinetic energy discrimination (KED) mode. Urine test results were standardized based on individual creatinine levels and expressed as “urine test results per gram creatinine.”

Data Analysis Procedures

The purpose of the nickel follow-up testing was to determine if there were continued exposures to nickel in this area. Nickel test results were compared to reference values from the Mayo Clinic [2]. According to the Mayo Clinic, urine levels up to 6 micrograms of nickel per gram creatinine (6 µg/g-cr) are normal for the general population and levels of 7 µg/g-cr or higher could suggest environmental and/or occupational exposures to nickel.

Results

During the follow-up nickel testing, DSHS collected urine samples from 67 participants. These urinary nickel results, adjusted for creatinine, are presented in the Table as micrograms of nickel per gram creatinine (µg/g-cr). All of the 67 urine samples tested contained detectable levels of nickel and 5 people (7.5%) had nickel levels greater than the reference value from the Mayo Clinic.

Table. Summary of urinary nickel results collected from 67 participants (April 2013).

Age Group (years)	Number Tested	Range (µg/g-cr)[a]	Number of Detects	Reference Value (µg/g-cr)[b]	Number above Reference Value
1-5	<5[c]	2.80-5.81	<5	0.0-6.0	0
6-11	10	1.57-10.23	10	0.0-6.0	<5
12-19	<5	0.61-4.32	<5	0.0-6.0	0
20+	49	0.63-10.15	49	0.0-6.0	<5

[a] Standardizing the results per gram creatinine is a standard practice in medicine when presenting urine test results.
[b] The reference value for nickel in urine is based upon information provided by the Mayo Clinic and applies to all ages [2].
[c] Counts of 1 to 4 are expressed as <5 to protect confidentiality.

Discussion

Introduction

In addition to normal dietary exposure, people can be exposed to chemicals by breathing, eating, drinking, or coming into contact with contaminated media. Nickel was detected in soil and elevated in ambient air samples collected by TCEQ during mobile monitoring trips. The degree to which people may be exposed to these contaminants depends on the concentrations in the air, the amount of time people spend outdoors, and the amount of air they breathe, which can be influenced by the amount of time they spend outdoors and the degree of physical exertion while outdoors.

It is difficult to predict adverse health effects based upon a urinary test result, and participants are cautioned not to attempt to draw any conclusions about other general health issues or concerns on the basis of these results. The purpose of this follow-up testing was to determine if ongoing exposure to nickel continued in the area of interest. We compared the nickel test results to reference values from the Mayo Clinic; exceeding the reference value does not mean that adverse health effects will occur. The Mayo Clinic does specify that levels above 50 µg/g-cr are levels of concern and indicate excess exposure to nickel [2].

No Continued Unusual Exposures to Nickel

All 67 people tested in April 2013 had detectable levels of nickel in their body. Nickel is commonly found in foods such as chocolate, soybeans, nuts, and oatmeal so it is not unusual for people to have some nickel in their body. Of the 67 people tested, 5 people had levels of nickel that exceeded the level the Mayo Clinic considers typical for the US general population (Table). Although this suggests that some people continue to have a higher-than-normal exposure, all of the urinary nickel test results were at least 5 times lower than the 50 µg/g-cr level identified by the Mayo Clinic as indicating excessive exposure [2].

Limitations

This report reflects the results of the follow-up testing effort which alone cannot be used to determine the source of nickel in any specific individual.

This was a one-time sampling event, and the nickel urinary test results only represent the level of nickel in the body at the time the sample was collected.

The follow-up nickel testing was limited to residents previously tested that had an elevated nickel test result. These data are representative only of those people tested; it was not a random sample and may not be representative of all residents who live or have lived in the area of interest. This screening analysis was not designed to be a comprehensive epidemiological study and should not be interpreted as such.

Urine samples were analyzed only for nickel. Therefore, participants are cautioned not to attempt to draw any conclusions about other general health issues or concerns on the basis of these results. A normal test result does not necessarily imply that the participant's health status is good; likewise, an elevated test result does not necessarily imply any increased risk for adverse effects or that existing health issues are connected to potential exposure to these contaminants.

Reference values provided by the Mayo Clinic were used for interpreting the urinary nickel results in this screening. The Mayo Clinic reference values were similar to reference values found in other published sources.

Conclusions

While we found detectable levels of nickel in participants, finding low levels of nickel in people is not unusual. Most people tested during this follow-up testing had urinary nickel levels consistent with what is considered normal by the Mayo Clinic. While it is not possible to determine the source of these exposures, there is no indication that the levels found will adversely affect the health of residents.

Recommendations

Individuals with health concerns should consult their personal physician. Although exposure to metals through dietary sources is normal, people concerned about environmental exposure should follow standard precautions for reducing exposure, such as washing hands after contacting soils outside and before eating. More information about reducing exposure to metals can be found at http://www.dshs.state.tx.us/epitox/education.shtm.

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References

1. Texas Department of State Health Services. Final Report: Metals Screening, Freeport, Brazoria County, Texas. January 14, 2013.
2. Mayo Clinic, Mayo Medical Laboratories. 2012. Test ID: NIRU, Nickel, Random, Urine, http://www.mayomedicallaboratories.com/test-catalog/Clinical+and+Interpretive/60441.

Appendix: Acronyms and Abbreviations

CDC	Centers for Disease Control and Prevention
DSHS	Texas Department of State Health Services
EIET	Environmental and Injury Epidemiology and Toxicology
ICP-UCT-MS	inductively coupled plasma-universal cell technology-mass spectrometer
KED	kinetic energy discrimination
µg/g-cr	micrograms per gram creatinine
NCEH	National Center for Environmental Health
TCEQ	Texas Commission on Environmental Quality
US	United States