National Health and Nutrition Examination Survey 2003-2004

Documentation, Codebook, and Frequencies

MEC Laboratory Component: Serum Cotinine

Survey Years:
2003 to 2004

SAS Export File:
L06cot_C.XPT

April 2006

NHANES 2003–2004 Data Documentation

Laboratory Assessment: Lab 6 – Serum Cotinine

Years of Coverage: 2003–2004 **First Published:** April 2006 **Last Revised:** N/A

Component Description

The specific aims of the component are: 1) to measure the prevalence and extent of tobacco use; 2) to estimate the extent of exposure to environmental tobacco smoke (ETS), and determine trends in exposure to ETS; and 3) to describe the relationship between tobacco use (as well as exposure to ETS) and chronic health conditions, including respiratory and cardiovascular diseases.

The tobacco component for NHANES will include questionnaire items on current and past use of cigarettes, pipes, cigars and smokeless tobacco. Exposure to ETS at home and at work and in-utero ETS exposure among children will also be obtained. ETS exposure will also be assessed for examinees 3 years of age and older through the measurement of serum cotinine, a metabolite of nicotine. In addition, use of nicotine replacement products (e.g., gum and patch) will be collected using questionnaires.

Eligible Sample

Participants aged 3 years and older who do not meet any of the exclusion criteria are eligible.

Description of Laboratory Methodology

Cotinine is a major metabolite of nicotine that may be used as a marker for both active smoking, and as an index to Environmental Tobacco Smoke (ETS) exposure, or "passive smoking". Cotinine is generally preferred over nicotine for such assessments because of its substantially longer half-life. The half-life of cotinine in plasma has been estimated to be about 15–20 hrs;[1–3] by contrast, the half-life of nicotine is only 0.5–3 hrs.[4-6] Cotinine may be measured in serum, urine or saliva – the half-life of cotinine in all three fluids is essentially the same. Cotinine concentrations tend to be higher (3–8×) in urine than in serum; however, for studies requiring a quantitative assessment of exposure, plasma or serum is regarded as the fluid of choice.[1] Therefore, serum was chosen for NHANES cotinine analyses.

Serum cotinine is measured by an isotope dilution-high performance liquid chromatography / atmospheric pressure chemical ionization tandem mass spectrometry (ID HPLC-APCI MS/MS). Briefly, the serum sample is spiked with methyl-D3 cotinine as an internal standard, and after an equilibration period, the sample is applied to a basified solid-phase extraction column. Cotinine is extracted off the column with methylene chloride, the organic extract is concentrated, and the residue is injected onto a short, C18 HPLC column. The eluant from these

injections is monitored by APCI-MS/MS, and the m/z 80 daughter ion from the m/z 177 quasi-molecular ion is quantitated, along with additional ions for the internal standard, external standard, and for confirmation. Cotinine concentrations are derived from the ratio of native to labeled cotinine in the sample by comparisons to a standard curve.

There were no changes to the equipment or lab site from the previous 2 years.

Laboratory Quality Control and Monitoring

The NHANES quality assurance and quality control (QA/QC) protocols meet the 1988 Clinical Laboratory Improvement Act mandates. Detailed QA/QC instructions are discussed in the NHANES Laboratory/Medical Technologists Procedures Manual (LPM). Read the LABDOC file for detailed QA/QC protocols.

A detailed description of the quality assurance and quality control procedures can be found on the NHANES website.

Data Processing and Editing

Serum specimens are processed, stored, and shipped to the Division of Environmental Health Laboratory Sciences, National Center for Environmental Health, Centers for Disease Control and Prevention for analysis.

Detailed specimen collection and processing instructions are discussed in the NHANES LPM. Vials are stored under appropriate frozen (–20°C) conditions until they are shipped to National Center for Environmental Health for testing.

This file contains no top coding.

The detection limits in each two year cycle from 1999 to 2004 has changed. For 1999-2000 the detection limit was .05 and the below the limit of detection value was .035.

For 2001-2002 there were two detection limits and below the limit of detection values. One of the detection limits was .05 and the below the limit of detection value was .035. The other detection limit was .015 and the below the limit of detection value was .011.

For 2003-2004 the detection limit was .015 and the below the limit of detection value was .011.

Detailed instructions on specimen collection and processing can be found on the NHANES website.

Analytic Notes

The analysis of NHANES 2003–2004 laboratory data must be conducted with the key survey design and basic demographic variables. The NHANES 2003–2004 Household Questionnaire Data Files contain demographic data, health indicators, and other related information collected during household interviews. The Household Questionnaire Data Files also contain all survey design variables and sample weights required to analyze these data. The Phlebotomy Examination file includes auxiliary information on duration of fasting, the time of day of the venipuncture, and the conditions precluding venipuncture. The Household Questionnaire and Phlebotomy Exam files may be linked to the laboratory data file using the unique survey participant identifier SEQN.

References

1. Jarvis MJ, Russell MAH, Benowitz NL, Feyerabend C. Elimination of cotinine from body fluids: Implications for noninvasive measurement of tobacco smoke exposure. Am J Public Health. 1988;78:696–698.

2. Benowitz NL, Kuyt F, Jacob P, Jones RT, Osman A-L. Cotinine disposition and effects. Clin Pharmacol Ther. 1983;34:604–611.

3. Kyerematen GA, Morgan ML, Chattopadhyay B, deBethizy JD, Vesell ES. Disposition of nicotine and eight metabolites in smokers and nonsmokers: Identification of two metabolites that are longer lived than cotinine. Clin Pharmacol Ther. 1990;48:641–651.

4. Jacob P, Yu L, Wilson M, Benowitz NL. Selected ion monitoring method for determination of nicotine, cotinine and deuterium-labeled analogs: Absence of an isotope effect in the clearance of (S)-nicotine-3',3'-d2 in humans. Biol Mass Spec. 1991;20:247–252.

5. Armitage AK, Dollery CT, George CF, Houseman TH, Lewis PJ, Turner DM. Absorption and metabolism of nicotine from cigarettes. Br Med J. 1975;4:313–316.

6. Watts RR, Langone JJ, Knight GJ, Lewtas J. Cotinine analytical workshop report: Consideration of analytical methods for determining cotinine in human body fluids as a measure of passive exposure to tobacco smoke. Env Health Perspec. 1990;84:173.

Locator Fields

Title: Serum Cotinine

Contact Number: 1-866-441-NCHS

Years of Content: 2003–2004

First Published: April 2006

Revised: N/A

Access Constraints: None

Use Constraints: None

Geographic Coverage: National

Subject: Serum Cotinine

Record Source: NHANES 2003–2004

Survey Methodology: NHANES 2003–2004 is a stratified multistage probability sample of the civilian non-institutionalized population of the U.S.

Medium: NHANES Web site; SAS transport files

National Health and Nutrition Examination Survey
Codebook for Data Production (2003-2004)

Cotinine (L06COT_C)
Person Level Data

April 2006

SEQN	Target
	B(3 Yrs. to 150 Yrs.)
Hard Edits	**SAS Label**
	Respondent sequence number
English Text: Respondent sequence number.	
English Instructions:	

LBXCOT	Target
	B(3 Yrs. to 150 Yrs.)
Hard Edits	**SAS Label**
	Cotinine (ng/mL)
English Text: Cotinine (ng/mL)	
English Instructions:	

Code or Value	Description	Count	Cumulative	Skip to Item
0.015 to 1639	Range of Values	6478	6478	
0.011	Below Limit of Detection	1314	7792	
.	Missing	764	8556	