National Institute for Occupational Safety and Health
Centers for Disease Control and Prevention

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Nanotubes and Nanofibers
Workers Occupationally Exposed to Carbon

Surveillance Recommendations
Summary of Medical Screening and
CNE
risks associated with exposure to CNT and
among steps to minimize potential health

respiratory effects
CMT/CNF may be at risk of adverse
Workers occupationally exposed to

Screening and surveillance – WHY?
Worker Particpation - WHO?

concentrations of CNT/CNF to intermittent elevated airborne

Workers who have the potential for exposure

[carbon as an 8-hour time-weighted average] concentrations > REL [7 ug/m³ elemental
Workers exposed to CNT/CNF at
Screening – WHAT?

- Written Report of Medical Findings
- Periodic Evaluations
- Initial Evaluation
Screening - WHAT?

- Initial Evaluation
- History
- Physical Exam - focus on respiratory
- Spirometry
- CXR
- Other - per professional judgment
Screening and Surveillance - WHAT?

- Consideration of specific tests
- Physical exam
- History, including respiratory symptom update
- Possibly annual, per professional judgment
- Regular intervals
- Periodic Evaluations
Worker Training

- Medical screening program
- How to report symptoms
- Routes of exposure
- Potential health risks
- Nature of exposures

Should include:
Prevention efforts

Exposure-related data that may assist to identify patterns or trends in health

Program

Aggregate / evaluate data from screening

Qualified health professional

Periodic Evaluation of Data
Periodic Re-Examination

Need

Examination As

Reports of Medical Findings

Findings of Concern

Occupational health update, physical exam [e.g., respiratory symptoms, update, medical and periodic evaluations based on initial examination]

Education Worker

Worker Exposed

Yes

No

Determination of

Workers exposed to CNT and CNE

NT and CNE

Determination of periodic reassessment, occupational history, medical history, medical examination

Other exams/tests deemed appropriate

Non-findings of concern

Initial Medical Examination

Baseline: Spirometry, Chest X-ray

Medical Surveillance Recommendations - CNT and CNE

More detailed follow-up as needed

Image scan quality is too low to read.
Ongoing systematic collection, analysis, and dissemination of exposure and health data on groups of workers for the purpose of preventing illness and injury.
Examinations or analyses
Longitudinal approach, recurrent
of exposed person(s)
health outcome or change in biologic function
Examines health status through tracking of

a complete safety and health management program

Medical surveillance is an established component of

Illness and injury
goals of workers for the purpose of preventing
dissemination of exposure and health data on
Ongoing systematic collection, analysis, and

MediCal Surveillence
Medical Monitoring (Screening)

- Cross sectional evaluation – one point in time
- Care and when intervention is beneficial
  exposed person would normally seek medical
  care in the very early stages of disease before
  and in the group of individuals
- Detect preclinical changes or changes that occur
- Medical testing/examination of individuals or
  surveillance
- Can be considered one type of medical
NIOSH recommends medical screening

- Ongoing medical screening

- 32 OSHA standards require screening

- Mandated by law or voluntarily
Goals of Medical Surveillance

- May contribute to primary prevention
- Generally considered secondary prevention
- Information to target intervention
- Estimate magnitude
- Identify trends and track distribution
- Detecting changes early
- Identify new hazards or outcomes
Figure 1. The cascade of occupational health prevention with examples of surveillance feedback (Adapted from Halperin 1996)
Medical Surveillance Program - Elements

- Testing modalities
- Target population
- Defined purpose/objective
- Exams - Content, frequency
- Questionnaires
- Tests - Types
Testing Monitoring Program

the health outcome and circumstances of

Important characteristics may vary depending on

- Positive predictive value, negative predictive value
- Sensitivity, specificity
- Accuracy, reproducibility

Properties of the test being considered

Medical Surveillance - Considerations With
Medical Surveillance/Screening & Benefits and Concerns

- Concerns
- Resources
- Costs of false positives or false negatives
- Potential follow-up of "false positive" tests
- Generation of "uninterpretable" data

- Benefits
- Related to goals of surveillance/screening
- Considerations - characteristics of tests, health outcome
- Early detection
- Primary prevention
Medical surveillance?

What hazard / exposure data will be needed to guide new recommendations concerning development of exposure limit and development of hazard identification historically, driven by establishing medical surveillance/screening recommendations for establishing medical criteria