Relationship between Quantitative Measurement of Paradoxical Chest & Abdominal Movement and the Apnea Hypopnea Index and Sleep Efficiency

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Although paradoxical movement of the chest (C) and abdomen (A) (PCA) is reported to be common in children with sleep disordered breathing (SDB), the relationship between it and the obstructive apnea hypopnea index (oAHI) and sleep quality is uncertain. We quantitated PCA using a simple algorithm that quantitated the lag in seconds between C and A signals in 5 sec windows during sleep in 36 children with varying degrees of SDB. Children had polysomnography (PSG) twice, those with SDB had their second study after adenotonsillectomy. PCA was expressed as the mean and the standard deviation (SD) of the lag time. For the initial PSG study, there was a significant relationship between oAHI and the variability of the lag time expressed as its SD ($r=0.42$, $p<0.01$) but not the mean lag time. When comparing data from the first to the second PSG study, improvements in oAHI as well as in sleep efficiency (SE) were correlated with improvements in lag SD ($r=0.74$, $p<0.001$, and $r=0.35$, $p<0.05$) but not with lag mean. We conclude that quantitative measurement of the variability of paradoxical movement of the chest and abdomen correlates with oAHI and with sleep quality and that it can be measured simply and quickly with a computer.

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Heat Stress and Sudden Infant Death Syndrome (SIDS) Incidence

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Objective: The heat stress theory for cause of SIDS is increased demands on an infant's thermoregulatory system imposed by prone position,increased environmental temperatures or increased insulation can cause death in infants even in absence of elevated body temperature. Altered cardiorespiratory mechanisms caused by heat stress have been implicated. We sought to determine the role of heat stress in SIDS by calculating SIDS rates associated with heat waves occurring at a time when most infants were placed prone. Past studies of heat waves indicate that infants are particularly vulnerable to heat related illness and indicate that parent's responses to their infant's distress are frequently delayed or inadequate.

Methods:We performed a retrospective study of SIDS rates and mortality rates due to excessive environmental heat in relation to climatological temperature during an epidemic of heat related of deaths. Data was collected for each of 454 counties in 4 states (Arkansas,Georgia, Kansas,and Missouri) from 5/1/1980 to 9/30/1980, and then summed to give the mortality rates for each 5°F (2.8°C) temperature range.

Results: Chi Square as well as Spearman's ranked correlation analyses revealed significant relationships for heat-related mortality rates and maximum ($p<0.0001$) or average daily temperature ($p<0.0001$), but not for SIDS rates ($p=0.362$ and $p=0.713$, respectively).

Conclusions:Since there was no significant association between SIDS and environmental temperature during periods of increased heat stress related deaths, it seems unlikely that autonomic or other defects in thermoregulation involving respiratory or cardiovascular systems are underlying causes of significant infant mortality attributed to SIDS.

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Prevalence of Pulmonary Function Abnormalities in Beryllium-Sensitized Individuals

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Chronic Beryllium Disease (CBD) is an occupational disorder characterized by granulomatous inflammation of the lungs. Previous reports on the prevalence of pulmonary function abnormalities in subjects with CBD were based on patients identified mainly on the basis of symptoms or radiographic abnormalities, and predated the widespread use of the beryllium lymphocyte proliferation test (BeLPT) for surveillance and screening of exposed workers. We hypothesized that the use of the BeLPT test identifies CBD patients early in the course of their disease before developing significant pulmonary function abnormalities. To test this hypothesis, we reviewed the medical records of 209 subjects exposed to beryllium who were referred for evaluation due to beryllium sensitization (2 or more positive blood BeLPT tests). All individuals underwent pulmonary function testing transbronchial biopsy (TBBx). CBD was defined by the presence of non-necrotizing granulomas on TBBx. Among 209 sensitized subjects, 77 had histopathologic evidence of CBD and 132 did not. Pulmonary function abnormalities were similar among CBD and sensitized-biopsy negative individuals and lower than previously reported [CBD: normal spirometry 79%, obstruction 12%, restriction 9%, and reduced diffusion capacity 23%; sensitized: normal spirometry 72%, obstruction 17%, restriction 11%, and reduced diffusion capacity 16%, p=NS]. Subjects who had evidence of obstruction on spirometry or abnormal diffusion capacity were more likely to be current or ex-smokers ($p=0.02$). These findings indicate that surveillance screening for CBD with the BeLPT identifies patients early and enables diagnosis prior to the onset of physiologic abnormalities. Most individuals with CBD have normal pulmonary function tests at the time of initial diagnosis.

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Risk of Beryllium Disease among Short-Term and Long-Term Workers at a Metal, Oxide and Alloy Production Plant

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Rationale. Workers at a beryllium facility producing metal, oxide and alloys were screened for beryllium sensitization and chronic beryllium disease (CBD) in 1993-94. A new survey was conducted in 1999 to determine whether disease prevalence had changed since the earlier survey. **Methods.** Workers not previously known to have CBD were asked to provide a blood sample for beryllium lymphocyte proliferation testing (BeLPT) and complete a medical & work history questionnaire. Beryllium sensitization was defined as 2 or more abnormal BeLPTs; sensitized workers were offered clinical evaluation for CBD. The workforce was subdivided as follows: long-term workers (LTWs) were screened in 1993-94; short-term workers (STWs) were hired after earlier screening. **Results.** 731 of 808 eligible workers (90%) participated, including 452 of 502 LTWs (90%) and 279 of 306 STWs (91%). Overall prevalence of sensitization was 11% (78/731), with similar proportions for LTWs (11%, 49/452) and STWs (10%, 29/279). 31 of the 78 sensitized were diagnosed with CBD (40%) for an overall CBD prevalence of 4% (31/731). LTWs were more likely to have CBD (6%, 25/452) compared to STWs (2%, 6/279). When health outcome data for LTWs from the 2 surveys were summed the prevalences of sensitization (18%) and disease (8%) were twice that observed in the 1993-94 cross-sectional study. **Conclusions.** Results indicate that levels of sensitization & CBD had not changed, despite significant engineering controls implemented after earlier survey. Differences between LTWs & STWs in CBD prevalence suggest that disease takes more time or greater cumulative lung burden to develop. Longitudinal surveillance is required to fully assess disease burden in beryllium workers.

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Frequency of Sensitization and Disease among Workers in Beryllium Service and Distribution Centers

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Rationale: Cross-sectional surveys in beryllium primary production facilities have revealed that 5 to 10% of screened workers were sensitized to beryllium, and 3 to 5% had chronic beryllium disease (CBD). Workers at service and distribution centers (SDCs) that handle copper beryllium alloy products in the form of strip, tubing, and rod and wire have not previously been studied. Workers in these centers perform final processing of products before distribution, and generally have lower exposure than workers in primary production facilities. In this study, workers at 3 SDCs were screened for beryllium sensitization and disease. **Methods:** 88 of the 100 workers at 3 copper beryllium alloy SDCs were screened for beryllium sensitization using the beryllium lymphocyte proliferation test (BeLPT). Participants who had 2 abnormal BeLPTs were classified as sensitized; sensitized workers were further evaluated for CBD, defined as the presence of granulomas on lung biopsy. Workers were categorized as having worked in secondary production areas, non-production areas, or both areas. **Results:** 1 of 88 workers tested was found to be sensitized and subsequently found to have CBD. For all tested workers: 42% (37/88) had performed jobs in secondary production areas, 41% (36/88) worked in non-production areas, and the remaining 17% (15/88) had worked in both areas. The prevalence of sensitization/CBD was 1.1% (1/88) for all tested, and 1.9% (1/52) for those who had worked in secondary production areas. **Conclusions:** Workers in these 3 copper beryllium alloy SDCs had lower prevalences of beryllium sensitization and CBD than workers previously studied in primary production facilities. These findings may be relevant to other users of copper beryllium alloy who perform similar operations.

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