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MAB3-PD-02 THE CHALLENGE OF SETTING OCCUPATIONAL EXPOSURE LIMITS (OELS) FOR ODORANTS AND IRRITANTS

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Introduction:

Setting occupational exposure limits (OELs) for odorous or irritating chemicals is a global occupational health challenge. Industrial hygienists and toxicologists are expected to set OELs for the numerous chemicals that are being introduced to the workplace. Often, however, there is inadequate knowledge about the toxicology of these chemicals and, if they are odorous or a sensory irritant, these characteristics are usually not recognized until they are used in large quantities. This paper presents a novel and simple method for setting OELs based on chemosensory models, taking into account odor and irritation thresholds.

Methods:

The importance of accounting for risk perception and communication, conditioned responses, inter-individual variability in tolerance, detection, and susceptibility when identifying an appropriate workplace concentration of odorous or irritant compounds is evaluated according to three chemosensory models defined by a chemical's odor and irritation thresholds. These parameters are then incorporated into a flow-chart style methodology which can be used to set an OEL for a specific chemical.

Results:

Our analysis indicates the OEL identified for a chemical odorant or irritant will depend on the type of chemosensory effect that the chemical is likely to exhibit. Experience has shown that chemicals with a low odor threshold often require low OELs even though many do not pose toxicity or irritation at those air concentrations.

Discussion and Conclusions:

There remains a need for OEL-setting organizations around the world to agree upon the percentage of the workforce that an OEL should protect and the types of toxicological endpoints that are sufficiently important to protect against (e.g., transient eye irritation, enzyme induction or other reversible effects). This is particularly true for the odorants and irritants. In the main, the methods presented here are worthy of consideration in the setting of OELs until better and more thorough consensus among professions is reached. This method could also be extended to environmental regulation where risk perception plays a dominate role in whether the public views the exposure as being reasonable or safe.

MAB3-PD-03 MEASURING POSSIBLE BIAS IN OCCUPATIONAL EPIDEMIOLOGY STUDIES OF SILICOSIS AND LUNG CANCER USING META ANALYSIS

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Background: Using data from workers' compensation claims is thought to introduce bias into occupational epidemiology studies. This bias has been assumed to operate in measuring the relationship between silicosis and lung cancer, so that subjects from compensation programs will have higher (or biased) lung cancer risk than silicosis patients from medical sources.

Methods: Using STATA we tested the hypothesis that lung cancer risk was greater (i.e., biased) among compensation claimants with silicosis than among medical or noncompensated patients with silicosis those diagnosed from hospitalized, surveillance, or clinical sources. **Results:** In a preliminary assessment we calculated a pooled metaanalysis relative risk (MARR) for 48 published studies of silicosis and lung cancer was 2.19 (95%CI 1.832.61). The MARR for the 26 compensation studies was 2.28 (95%CI 1.932.70), and for the 22 noncompensation studies the MARR was 2.39, (95%CI 1.962.91). The differences between the two were nonsignificant.

Conclusions: In the preliminary assessment using STATA's metaanalysis program, we found no support for a biased RR when comparing the lung cancer risk between silicosis compensation claimants and medical noncompensation subjects. This work also reiterates the link between silicosis and lung cancer and supports silica exposure as a human carcinogen

MAB3-PD-04 TUMOR NECROSIS FACTOR-ALPHA AND INTERLEUKIN-8 EXPRESSION INDUCED BY SILICA DUST EXPOSURE

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Background: Most of the experimental and a few numbers of human studies support the view that tumor necrosis factor-alpha (TNF- alpha) plays a key role in the initiation of inflammatory responses to silica particle in the lung tissue. It stimulates the macrophages, epithelial cells and fibroblasts to release chemokines, such as interleukin (IL)-8, which are directly chemotactic to leukocytes and other cells that participate in inflammation. Silica particle could stimulate epithelial cells to release chemokines itself and stimulate inflammatory cell recruitment. We decided to make a comparative evaluation of IL-8 and TNF- alpha concentration in serum blood of patients with silicosis and healthy men who have been working under silica dust exposure more than 15 years.

Methods: The subjects in the study were 36 men, between the ages of 45 and 60, with silicosis (n=24) and without occupational lung disorders (n=12). The silicosis group was subdivided into 3 subgroups depending on X-Ray stages of the diseases: silicosis I (n=10), silicosis II (n=10), silicosis II-III or III (n=4). They were patients of Occupational Health and Allergology Departments of 10th Clinical Hospital, Minsk. The concentration of the cytokines in blood serum was measured by ELISA kits (St-Petersburg, Russia).

Results: The serum TNF- alpha concentration in the silicosis group ranged from 1.44 to 4.25 pg/ml and in the healthy group from 0.0 to 3.85 pg/ml; for IL-8 in the silicosis group ranged from 1.77 pg/ml to 8.06 pg/ml and in the healthy group from 0.0 pg/ml to 5.24 pg/ml. The descriptive statistics data was shown on the Table 1. We did not find significant differences of serum concentration of TNF- alpha between silicosis and healthy group. It was even normal. The level of IL-8 was significantly higher in the silicosis groups I and II (p<0.05). There was a tendency of IL-8 secretion decreasing in silicosis groups from the early to the latest stages of the diseases.

Conclusion: The secretion of such pro-inflammatory cytokine as TNF- alpha could be normal as on the initial as on the latest stages of the silicosis. Chemokines, such as IL-8 being induced by TNF- alpha are responsible for silica particle-induced inflammation especially at the beginning of the pulmonary fibrosis.

Table 1. Descriptive statistics for patients with silicosis and healthy workers

	Healthy (Mean±SD)	Silicosis I (Mean±SD)	Silicosis II (Mean±SD)	Silicosis II-III, III (Mean±SD)
TNF- alpha (pg/ml)	2.74±0.97	3.19±0.73	2.63±0.85	3.14±0.53
IL-8 (pg/ml)	3.01±1.87	5.12±1.58*	4.58±1.59*	4.36±2.25
N	12	12	10	4

*p<0.05; TNF- alpha =tumor necrosis factor-alpha; IL-8= interleukin 8