Reproductive hazards in the working environment

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FIOH

Metal mercury

- Decreased fertility (fecundability 63% of the comparisons) among dental assistants (Rowland et al, -94)
- Women working in dentistry: increased menstrual disorders, spontaneous abortions, stillbirths and congenital malformations in the offspring (Sikorski et al, -87)

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ferritin and decrease in creatinine, Fe, VB1 and estradiol.
Conclusion: Increase in distal latency and total protein and decrease in MCV were also found in our previous animal study. Benton test showed inferior cognitive function, which accords with the recent severe cases in Salt Lake City. The present study not only confirmed that exposure to 1-BP elongated DL in humans, which was shown by our previous investigation, but also newly showed decrease in MCV as well as increase in total protein in human.

NEUROTOXIC SYMPTOMS AMONG DENTAL ASSISTANTS

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Introduction: One of the main work tasks for dental assistants is to help the dentist in preparation of filling material of teeth. Amalgam was the filling material mostly used in Norway before 1980. It has now declined to about 5% of all fillings in 2005. Amalgam is an alloy of silver, copper, tin and mercury. Metallic mercury is known to be neurotoxic, shown in studies of workers engaged in production using mercury, as well as in mercury and gold mining. Few studies have been published of dental assistants. The aim of this study was to compare the occurrence of neurotoxic symptoms among dental assistants likely to be exposed to mercury in dental fillings, compared to similar health personell with no mercury exposure. Material and methods: All dental assistants borne before 1970 and after 1935 registered in a Dental assistant association in a county of Norway were invited to participate, as well as a similar number of randomly selected assistant nurses from another association in the same age group. The participants answered a self-administered, mailed questionnaire, with questions about demographic variables, life-style, musculoskeletal symptoms and neurotoxic symptoms (Euroquest). The response rate was 68% for dental assistants and 87% for the assistant nurses. Results: The dental assistants reported significant higher occurrence of neurotoxic symptoms, such as memory disturbance, tremor, anxiety and depression. Adjusting for age, education level and lifestyle factors by logistic regression did not materially change the results. Conclusion: The relation between the higher occurrence of neurotoxic symptoms among the dental assistants and their exposure to mercury ought to be studied further.

OCCUPATIONAL EXPOSURE TO WELDING FUME AND ALTERATION OF SERUM METALS AND PROLACTIN

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We evaluate the alteration of serum metals in shipyard welders exposed to welding fume and the relationship with airborne exposure level and serum prolactin (PRL). Cross-sectional study was conducted on 140 welders, aged 46.1±5.0 years old, who have been working for 17.4 years (range: 2 to 35 years) in twelve shipyards. One hundred office workers, who were not exposed to neurotoxic chemicals and of comparable age, composed the control group. We analyzed serum concentrations of manganese (BMn), iron (BIFe), calcium (BCA), lead (BPb), cooper (BCu), aluminum (BAl), zinc (BZn), and prolactin (PRL). We measured present airborne metals including Mn (AMn), iron (AFe), lead (APb), cooper (ACu), aluminum (AAl), zinc (AZn), and total welding fume. Cumulative exposed index (CEI) of airborne Mn was calculated. CEI and geometric mean of recent Mn of welders were 1.4 ± 1.2 mg/m^3•year (range: 0.1-4.4), 0.4 ± 3.84 mg/m^3 (range: 0 - 3.8) respectively.
BMn, BPb, BCu, BAL were significantly higher in welders (1.57 µg/dl, 3.31 µg/dl, 92.0 µg/dl, and 0.68 µg/dl respectively) than controls (1.14 µg/dl, 2.91 µg/dl, 89.5 µg/dl, and 0.57 µg/dl respectively). BCA was lower in welders (9.22 µg/dl) compare to control (9.33 µg/dl). AFe, ACu, and AAl inversely correlated with BCA. The relationship between PRL and BFe was significant negatively. BMn and BZn increased significantly along with mean concentration of previous Mn. But with CEI of Mn, only BZn showed positive relationship. These findings suggest that occupational exposure to welding fumes among welders disturbs the homeostasis of serum metals and prolactin.

RELATIONSHIP BETWEEN PHYSICOCHEMICAL PARAMETERS AND THE IN VITRO TOXICITY OF CARBON NANOTUBES, METAL OXIDES AND QUANTUM DOT NANOPARTICLES IN HUMAN EPITHELIAL CELL ASSAY A549

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Some studies indicate that the particle induced inflammation and cytotoxicity of insoluble particles is controlled mainly by the specific particle surface area. However, the toxicity of particles also depends on other parameters, e.g., surface properties, solubility and metal toxicity. For the same compound, thermodynamic properties may result in different polymorphs (atomic structures) at various particle sizes. For example, the thermodynamic stable TiO_2 structure varies from rutile (tetragonal), to brookite (orthorhombic) to anatase (tetragonal) at increasing surface area. Because different polymorphs have different surface structures and surface reactivities, the biological reactivity of compounds such as TiO_2 may vary, not only as function of surface area, but also as function differences in the atomic structure of the material analyzed. However, if the main parameters that control the particle toxicity, can be identified, this may be a very efficient way to perform preliminary risk evaluation of new particles. Especially in evaluating the new particles produced in the growing nanoparticle production. In this study, we investigate whether the combination of surface area and surface reactivity measures correlate with the variation in toxicity (in vitro) of several nanoparticles, including two TiO_2 and ZrO_2 nanoparticle series with different polymorphs and specific BET surface areas ranging from 1.2 to 236 m^2/g and mean XRD crystallite sizes between 5.3 and 77.5 nm. The tests of inflammatory potential, cytotoxicity and DNA-damage were conducted in human epithelial cell assay A549 at 24-h exposure to 0, 0.01, 0.02. 0.04, 0.08, 0.16 and 0.32 mg material/ml at 37°C. So far the results have shown that nanoparticulate TiO_2 was more cytotoxic than nanoparticulate ZrO_2 and that the toxic potential of the same compounds/polymorphs form individual trend-lines with increasing toxicity at decreasing crystal size or increasing BET surface area. Some of the nanoparticles may have inhibitory effects on interleukine secretion. Further studies includes test of DNA-damage and relevant measures for surface reactivity.

ESTABLISHING A LOCAL REFERENCE STANDARD FOR NEUROBEHAVIOURAL TEST PERFORMANCE

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Introduction: neurobehavioural tests are used in the evaluation of workers with work-related neurobehavioural dysfunction and identification of workers with exposure to neurotoxic hazards, such as solvents like toluene and carbon disulphide, and heavy metals.
Objective: to establish a local reference standard for some neurobehavioral tests.
Materials and Methods: a battery of five tests was identified to assess the various aspects of neurobehavioural performance. The battery includes tests of simple reaction time, finger tapping, digit span memory, symbol digit matching and the Santa Ana manual dexterity test, for assessing concentration and attention, motor skills and strength, short-term memory, visuomotor coordination and manual dexterity. 107 male Chinese workers, unexposed to neurotoxic hazards, from two shipyards were given questionnaires and administered the battery of tests. Workers with a history of alcoholism, epilepsy, psychiatric disorder, previous neurological diseases, head injury, or diabetes mellitus were excluded.
Results: the symbol digit matching test was significantly affected by the worker's age and educational level, with the younger and better educated workers performing better than the older and less educated ones. For the Santa Ana manual dexterity test for both hands, age was a significant factor, with younger workers performing better than older ones. The tests of simple reaction time, finger tapping, digit span, and the Santa Ana manual dexterity for dominant and non-dominant hands were not significantly affected by age and educational levels of the workers.
Conclusion: the results would serve as reference values for the evaluation of local Chinese male workers from different age and educational groups with work-related neurobehavioural dysfunction and may be used as a package or selectively.