

## REVISTAS ELECTRÓNICAS – N°28

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ENVIRONMENTAL HEALTH PERSPECTIVES (EHP) – National Institute of Environmental Health Sciences (EE.UU)

EJEMPLAR: Volume 115, Number 7, July 2007

IDIOMA: inglés

CONTENIDO DESTACADO:

### [OFFICE WORK EXPOSURES AND ADULT-ONSET ASTHMA.](#)

**Abstract:** *Background:* Office exposures have been linked to symptoms of sick building syndrome, but their relation to the development of asthma has not been studied previously. These exposures have increasing importance because an increasing proportion of the workforce is working in office environments. *Objectives:* The aim of this study was to assess the relations of exposure to carbonless copy paper (CCP), paper dust, and fumes from photocopiers and printers to adult-onset asthma. *Methods:* We conducted a population-based incident case-control study of adults 21–63 years of age living in the Pirkanmaa District in South Finland. All new clinically diagnosed cases ( $n = 521$ ) of asthma were recruited during a 3-year study period. A random sample of the source population formed the controls ( $n = 1,016$ ). This part focused on 133 cases and 316 controls who were office workers according to their current occupation classified by the 1988 International Standard Classification of Occupations. All participants answered a questionnaire on health, smoking, occupation, and exposures at work and home. Subjects with previous asthma were excluded. *Results:* Exposures to paper dust [adjusted odds ratio (OR) = 1.97; 95% confidence interval (CI), 1.25–3.10] and CCP (OR = 1.66; 95% CI, 1.03–2.66) were related to significantly increased risk of adult-onset asthma. An exposure-response relation was observed between exposure to paper dust and risk of asthma. *Conclusions:* This study provides new evidence that exposures to paper dust and CCP in office work are related to increased risk of adult-onset asthma. Reduction of these exposures could prevent asthma in office workers. Clinicians seeing asthma patients should be aware of this link to office exposures. *Key words:* asthma, carbonless copy paper, case-control study, paper dust, photocopiers, population-based.

### [NIGHT HEART RATE VARIABILITY AND PARTICULATE EXPOSURES AMONG BOILERMAKER CONSTRUCTION WORKERS.](#)

**Abstract:** *Background:* Although studies have documented the association between heart rate variability (HRV) and ambient particulate exposures, the association between

HRV, especially at night, and metal-rich, occupational particulate exposures remains unclear. *Objective:* Our goal in this study was to investigate the association between long-duration HRV, including nighttime HRV, and occupational PM<sub>2.5</sub> exposures. *Methods:* We used 24-hr ambulatory electrocardiograms (ECGs) to monitor 36 male boilermaker welders (mean age of 41 years) over a workday and nonworkday. ECGs were analyzed for HRV in the time domain ; rMSSD (square root of the mean squared differences of successive intervals) , SDNN (SD of normal-to-normal intervals over entire recording) , and SDNN<sub>i</sub> (SDNN for all 5-min segments) were summarized over 24-hr, day (0730–2130 hours) , and night (0000–0700 hours) periods. PM<sub>2.5</sub> (particulate matter with an aerodynamic diameter  $\leq 2.5 \mu\text{m}$ ) exposures were monitored over the workday, and 8-hr time-weighted average concentrations were calculated. We used linear regression to assess the associations between HRV and workday particulate exposures. Matched measurements from a nonworkday were used to control for individual cardiac risk factors. *Results:* Mean ( $\pm \text{SD}$ ) PM<sub>2.5</sub> exposure was  $0.73 \pm 0.50 \text{ mg/m}^3$  and ranged from 0.04 to  $2.70 \text{ mg/m}^3$ . We observed a consistent inverse exposure-response relationship, with a decrease in all HRV measures with increased PM<sub>2.5</sub> exposure. However, the decrease was most pronounced at night, where a 1-mg/m<sup>3</sup> increase in PM<sub>2.5</sub> was associated with a change of  $-8.32$  [95% confidence interval (CI),  $-16.29$  to  $-0.35$ ] msec nighttime rMSSD,  $-14.77$  (95% CI,  $-31.52$  to  $1.97$ ) msec nighttime SDNN, and  $-8.37$  (95% CI,  $-17.93$  to  $1.20$ ) msec nighttime SDNN<sub>i</sub>, after adjusting for nonworking nighttime HRV, age, and smoking. *Conclusion:* Metal-rich particulate exposures were associated with decreased long-duration HRV, especially at night. Further research is needed to elucidate which particulate metal constituent is responsible for decreased HRV. *Keywords:* environmental cardiology, heart rate variability, occupational, particulate exposures, welders.

#### MODELING MESOTHELIOMA RISK ASSOCIATED WITH ENVIRONMENTAL ASBESTOS EXPOSURE..

Abstract. *Background:* Environmental asbestos pollution can cause malignant mesothelioma, but few studies have involved dose-response analyses with detailed information on occupational, domestic, and environmental exposures. *Objectives:* In the present study, we examined the spatial variation of mesothelioma risk in an area with high levels of asbestos pollution from an industrial plant, adjusting for occupational and domestic exposures. *Methods:* This population-based case-control study included 103 incident cases of mesothelioma and 272 controls in 1987–1993 in the area around Casale Monferrato, Italy, where an important asbestos cement plant had been active for decades. Information collected included lifelong occupational and residential histories. Mesothelioma risk was estimated through logistic regression and a mixed additive-multiplicative model in which an additive scale was assumed for the risk associated with both residential distance from the plant and occupational exposures. The adjusted excess risk gradient by residential distance was modeled as an exponential decay with a threshold. *Results:* Residents at the location of the asbestos cement factory had a relative risk for mesothelioma of  $10.5$  [95% confidence interval (CI),  $3.8$ – $50.1$ ] , adjusted for occupational and domestic exposures. Risk decreased rapidly with increasing distance from the factory, but at 10-km the risk was still 60% of its value at the source. The relative risk for occupational exposure was  $6.0$

(95% CI, 2.9–13.0) , but this increased to 27.5 (95% CI, 7.8–153.4) when adjusted for residential distance. *Conclusions:* This study provides strong evidence that asbestos pollution from an industrial source greatly increases mesothelioma risk. Furthermore, relative risks from occupational exposure were underestimated and were markedly increased when adjusted for residential distance. *Key words:* asbestos, mesothelioma, spatial models

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INTERNATIONAL JOURNAL OF OCCUPATIONAL AND ENVIRONMENTAL  
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CONTENIDO:

[FEATURE: BIAS AND DILUTION IN COHORT STUDIES.](#) Health effects of occupational exposures are frequently evaluated by comparing the mortality of a whole cohort of workers with that of the general population. This study design may be affected by two major biases: a dilution effect (DE), due to the inclusion of unexposed subjects in the study cohort, and a comparison bias (CB), due to the different distribution of risk factors in the reference population. A theoretical model of the joint effect of DE and CB is proposed. Their impact was evaluated in two actual cohorts, selecting specific causes of death based on a priori hypotheses of an association. A linear relationship between the risk estimates and the two biases was found after applying either direct or indirect standardization to adjust for confounding. In the two cohorts, higher risks in

exposed workers emerged only after adjusting for DE and CB. Cohort studies without an internal referent group may provide unreliable results.

**AMMONIA RESPIRATORY EFFECTS OF FERTILIZER.** Personal exposures to ammonia and acute respiratory effects were determined in workers at a urea fertilizer factory in Bangladesh. Full-shift personal exposure to ammonia was measured using a PAC III direct reading instrument and Dräger diffusion tubes. Respiratory symptoms were elicited by a questionnaire study ( $n = 113$ ), and preshift and postshift lung function (FVC, FEV1, and PEFR) were tested using spirometry ( $n = 88$ ). Urea plant workers had higher mean exposure to ammonia and prevalence of acute respiratory symptoms than did workers in the ammonia plant. The symptoms with highest prevalence in the urea plant were chest tightness (33%) and cough (28%). FVC and FEV1 decreased significantly across the work shift among urea plant workers. The higher level of exposure to ammonia in the urea plant was associated with an increased prevalence of respiratory symptoms and an acute decline in lung function. Key words: ammonia; respiratory symptoms; lung function; fertilizer factory.

**ORGANIZATION OF SMALL METAL FABRICATORS.** Small U.S. businesses are underserved in terms of occupational health and safety (OHS) services. Little is known about organizational factors influencing OHS in these establishments. Machine guarding was quantitatively evaluated in 40 small businesses. Checklists were used to develop safety scores. Organizational information such as number of employees, unionization, and number of machines was obtained. Experience modification rates, annual sales, and credit ratings were also obtained. Safety scores were divided into terciles. Businesses with safety scores in the top third were unionized, had effective safety committees, and had been operational for more than 30 years. Interventions and policies targeted toward development and implementation of safety committees are needed to improve OHS in this cohort. Financial capability had no bearing on ability of a small business to mount an OHS programs. Non-unionized small businesses may be more vulnerable to occupational injuries. Key words: organizational characteristics; small business; machine guarding; occupational health.

**PNEUMONIA IN CHILDREN OF A SMELTER TOWN.** Since German reunification in 1990, most heavy industries in Eastern Germany have been shut down. Although air quality has improved in terms of sulfur dioxide and particulate matter (PM), the content of certain metals in PM in industrial areas is persistently high. Lifetime pneumonia prevalence in schoolchildren born after unification in the heavy-metal industrial area Hettstedt remain elevated. One difference between low and high pneumonia-prevalence areas seems to be the residual concentrations of heavy metals in respirable air. Toxicological and human exposure studies of Hettstedt particles have shown metal-rich PM from Hettstedt to have greater toxicity and inflammatory properties than the PM of the control region. Past industrial emissions might still play a decisive role decades after the closing of sources, and pneumonia should be considered a possible acute health burden caused by metal-rich air pollution. Key words: pneumonia; particulate matter; elemental composition; metals; former industries.

**VITAMIN A MAY ALLEVIATE PRENATAL POLLUTANT EXPOSURE EFFECTS.** A cohort study assessed the relationship between dietary intake of vitamin A in 493 healthy mothers before and around conception and adverse birth outcomes associated with

environmental toxicant exposures. The cohort, non-smoking women with singleton pregnancies, aged 18–35 years, gave birth at 34–43 weeks of gestation. The women were asked about their diets over one year preceding pregnancy. Measurements of PM<sub>2.5</sub> were carried out during the second trimester. Birth outcomes were adjusted for potential confounding factors, including gestational age. Standardized beta regression coefficients confirmed an inverse association between PM<sub>2.5</sub> and birth weight (beta = -172.4, p = 0.02), but the effect of vitamin A on birth weight was positive (beta = 176.05, p = 0.05), when the two were adjusted for each other. The negative effect of higher prenatal PM<sub>2.5</sub> exposures (above third tertile) on birth weight was significant in women below the third tertile of vitamin A intakes (beta = -185.1, p = 0.00), but not in women with higher intakes (beta = 38.6, p = 0.61). The negative effect of higher PM<sub>2.5</sub> exposure on length at birth was significant with lower vitamin A intakes (beta = -1.1, p = 0.00) but not with higher intakes (beta = -0.3, p = 0.56). Prepregnancy nutrition of mothers may modulate the harmful effects of prenatal exposures to pollutants on birth outcomes. Key words: air pollutants; prenatal exposure; prepregnancy vitamin A intake; cohort study; fetal growth.

**ISOCYANATE-, UREAFORMOL-, AND FORMOPHENOLIC-RELATED SYMPTOMS IN MINERS.** The respiratory effects of diphenylmethane diisocyanate (MDI)-based resins and ureaformol- and formophenolic- based resins, used in coal mining, are unknown. This cross-sectional study of 354 miners evaluated respiratory health in miners with MDI-related symptoms (IS) and ureaformol/formophenolic-related symptoms (UFS). The protocol included clinical examination, chest radiograph, questionnaire on respiratory symptoms, smoking habit, job history, resin handling, and spirometry. Resin handling concerned 27.7% of the miners. IS affected 5.6%, and 1.4% also after work. UFS affected 22.6%, and 2.3% also after work. Wheezing affected 35.6%; chronic cough, expectoration, or bronchitis about 10%; dyspnea 5.4%; and asthma 2.8%. The miners with UFS had significantly more frequent chronic cough, expectoration, chronic bronchitis, dyspnea, and wheezing, whereas those with IS at and after work had markedly lower FVC, FEV1, MMEF, FEF50%, and FEF25%. These findings raise the possibility of deleterious effects of exposures to MDI and ureaformol/ formophenolic resins on respiratory health and lung function in coal miners during their working life. Key words: 4,4'-diphenylmethane diisocyanate; ureaformol; formophenolic; respiratory symptoms; lung function.

**ECOSYSTEM APPROACH TO CONTROL DENGUE.** The authors developed and evaluated a comprehensive participatory ecosystem health approach for preventing the transmission of dengue, the most prevalent vector-borne disease in Cuba and the Latin America-Caribbean region. The integrated surveillance system central to this initiative encompassed three main subsystems (environmental; entomological; clinical-epidemiologic), relying on extensive community involvement. The study was conducted in Central Havana, Cuba. Indicators from each subsystem were selected and mapped using a GIS procedure providing instant visualization by city block in the municipality. To elucidate the factors affecting control and prevention efforts, perceived needs and risks, as well as knowledge, attitudes, and behaviors related to dengue, were assessed. Specific factors associated with the presence of mosquito breeding sites and risks of

dengue were examined in a case-control study. Key words: dengue; surveillance; ecosystem health.

**MONGOLIAN OCCUPATIONAL LUNG DISEASES.** Mining production has accounted for around 50% of the gross industrial product in Mongolia since 1998. Dust-induced chronic bronchitis and pneumoconiosis currently account for the largest relative share (67.8%) of occupational diseases in Mongolia, and cases are increasing annually. In 1967-2004, medically diagnosed cases of occupational diseases in Mongolia numbered 7,600. Of these, 5,154 were confirmed cases of dust-induced chronic bronchitis and pneumoconiosis. Lung diseases and other mining-sector health risks pose major challenges for Mongolia. Gold and coal mines, both formal and informal, contribute significantly to economic growth, but the prevalence of occupational lung diseases is high and access to health care is limited. Rapid implementation of an effective national program of silicosis elimination and pneumoconiosis reduction is critical to ensure the health and safety of workers in this important sector of the Mongolian economy. Key words: Mongolia; coal mining; gold mining; informal sector; pneumoconiosis; dustinduced chronic bronchitis.

#### *SPECIAL CONTRIBUTIONS*

**CADMIUM-INDUCED CANCERS.** Discovered in the early 1800s, the use of cadmium and various cadmium salts started to become industrially important near the close of the 19th century, rapidly thereafter began to flourish, yet has diminished more recently. Most cadmium used in the United States is a byproduct from the smelting of zinc, lead, or copper ores, and is used to manufacture batteries. Carcinogenic activity of cadmium was discovered first in animals and only subsequently in humans. Cadmium and cadmium compounds have been classified as known human carcinogens by the International Agency for Research on Cancer and the National Toxicology Program based on epidemiologic studies showing a causal association with lung cancer, and possibly prostate cancer, and studies in experimental animals, demonstrating that cadmium causes tumors at multiple tissue sites, by various routes of exposure, and in several species and strains. Epidemiologic studies published since these evaluations suggest that cadmium is also associated with cancers of the breast, kidney, pancreas, and urinary bladder. The basic metal cationic portion of cadmium is responsible for both toxic and carcinogenic activity, and the mechanism of carcinogenicity appears to be multifactorial. Available information about the carcinogenicity of cadmium and cadmium compounds is reviewed, evaluated, and discussed. Key words: cadmium; carcinogenicity; animal studies; environmental exposures; epidemiologic studies; public health; occupational exposures; cancer bioassays; extrapolation.

**BENZENE-INDUCED CANCERS.** Benzene-induced cancer in humans was first reported in the late 1920s. Carcinogenesis findings in animals were not reported conclusively until 1979. Industry exploited this “discrepancy” to discredit the use of animal bioassays as surrogates for human exposure experience. The cardinal reason for the delay between first recognizing leukemia in humans and sought-after neoplasia in animals centers on poor design and conduct of experimental studies. The first evidence of carcinogenicity in animals manifested as malignant tumors of the zymbal glands (sebaceous glands in the ear canal) of rats, and industry attempted to discount this as being irrelevant to humans, as this organ is vestigial and not present per se in humans. Nonetheless,

shortly thereafter benzene was shown to be carcinogenic to multiple organ sites in both sexes of multiple strains and multiple species of laboratory animals exposed via various routes. This paper presents a condensed history of the benzene bioassay story with mention of benzene-associated human cancers. Key words: benzene; carcinogenicity; industry influence; history; bioassay; public health; occupational safety; primary prevention.

#### *COMMENTARY*

**DATA MANIPULATION IN SHELL BENZENE STUDY.** In 1983, in the face of mounting evidence of excess leukemia among workers at Shell Oil's Wood River (IL) and Deer Park (TX) petroleum refineries, Shell initiated the Benzene Historical Exposure Study (BHES). Shell's prior research had implicated occupational exposure to benzene as the source of the excess leukemia. The BHES report submission, which ultimately found no link between exposure and the excess morbidity, coincided with OSHA's planned hearings over a new regulatory standard for benzene. Over the next two decades, Shell published several papers based on or expanding the BHES data, all of which concluded that the excess of leukemia was unrelated to benzene. A review of the raw data on which Shell and its consultants relied reveals that Shell manipulated and omitted data in order to reach conclusions that exculpated it from liability and helped delay stricter benzene regulation. Key words: benzene, petroleum, occupational health, leukemia

**SIR RICHARD DOLL AND OCCUPATIONAL CANCER.** In 2006, the English media broke the story that Sir Richard Doll had for many years been retained on a secret consultancy by Monsanto. Doll's colleagues rushed to his defense, arguing that the story was an unjustified smear on a great man whose work had saved millions of lives. However, Doll's conflicts of interest in his occupational health epidemiology are shown to sit uneasily alongside his more independent smoking/ lung cancer studies. Key words: Sir Richard Doll; conflicts of interest.

**CANADA'S ASBESTOS LEGACY.** Despite international efforts to block Canada's export of asbestos, the Canadian federal government continues to defend the economic interests of the asbestos industry. Ironically, Canadian asbestos miners, mill workers, and those engaged in a wide range of other occupations continue to suffer asbestos-related disease and premature death. Although there is an employerfunded compensation system in each province, many workers with mesothelioma and other asbestos-related diseases remain uncompensated. The export of Canadian asbestos to developing countries sets the stage for another preventable occupational disease epidemic that will manifest over the coming decades. There is growing support from the Canadian labor movement for an end to asbestos exportation and for a just transition strategy for the asbestos workers and their communities. Key words: asbestos; Canada; labor unions; mesothelioma; industry influence.

#### *EDITORIAL*

#### **EPA BUDGET CUTS INCREASE RELIANCE ON INDUSTRY DATA**

#### *LETTERS*

#### **Response to Beecher's Comment to *The Scientist***

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CONTENIDO:

**ASSESSING THE INFLUENCE OF ANTIVIBRATION GLOVE ON DIGITAL VASCULAR RESPONSES TO ACUTE HAND-ARM VIBRATION.**

This study was designed to assess the influence of an antivibration glove on digital vascular responses in healthy subjects exposed to short-term grasping of a vibrating handle. To measure finger blood flow (FBF) and finger skin temperature (FST) once at the end of every min, a blood flowmeter sensor was attached to the dorsum and a thermistor sensor was attached to the medial surface of the subject's middle phalanx of the third finger of the right hand. After 5 min of baseline measurements without or with an antivibration glove meeting ISO standard 10819, worn on the right hand, subjects gripped a vibrating handle with the same hand for a period of 5 min. Vibration was generated at two frequencies of 31.5 Hz and 250 Hz with a frequency weighted rms acceleration of 5.5 m/s<sup>2</sup>. FBF and FST continued to be recorded for a further 5 min after release of the vibrating handle. Statistical analysis showed no significant change after vibration exposure in either FST or FBF at 250 Hz, compared to baseline (control) measurements while using the antivibration glove. At 31.5 Hz, FBF data exhibited a significant difference between before and after grasping of vibrating handle, which was less under the condition of wearing the antivibration glove than under the condition of bare hand. The results provide evidence that the antivibration glove considerably influenced finger vascular changes in healthy subjects induced by vibration exposure, especially against high frequency vibration. Further studies are required to assess finger vascular responses to hand-transmitted vibration with antivibration gloves of different manufacturers.

**Key words:** Finger vascular response, Influence, Vibration, Antivibration glove

**DI(2-ETHYLHEXYL)PHTHALATE INDUCES HEPATIC TUMORIGENESIS THROUGH A PEROXISOME PROLIFERATOR-ACTIVATED RECEPTOR A-INDEPENDENT PATHWAY.**

Di(2-ethylhexyl)phthalate (DEHP), a commonly used industrial plasticizer, causes liver tumorigenesis presumably via activation of peroxisome proliferator-activated receptor alpha (PPAR $\alpha$ ). The mechanism of DEHP tumorigenesis has not been fully elucidated, and to clarify whether DEHP tumorigenesis is induced via PPAR $\alpha$ , we compared DEHP-induced tumorigenesis in wild-type and *Ppar $\alpha$* -null mice. Mice of each genotype were divided into three groups, and treated for 22 months with diets containing 0, 0.01 or 0.05% DEHP. Surprisingly, the incidence of liver tumors was higher in *Ppar $\alpha$* -null mice exposed to 0.05% DEHP (25.8%) than in similarly exposed wild-type mice (10.0%). These results suggest the existence of pathways for DEHP-induced hepatic tumorigenesis that are independent of PPAR $\alpha$ . The levels of 8-OHdG increased dose-dependently in mice of both genotypes, but the degree of increase was higher in *Ppar $\alpha$* -null than in wild-type mice. NF $\kappa$ B levels also significantly increased in a dose-dependent manner in *Ppar $\alpha$* -null mice. The protooncogene c-jun-mRNA was induced, and c-fos-mRNA tended to be induced only in *Ppar $\alpha$* -null mice fed a 0.05% DEHP-containing diet. These results suggest that increases in oxidative stress induced by

DEHP exposure may lead to the induction of inflammation and/or the expression of protooncogenes, resulting in a high incidence of tumorigenesis in *Pparα*-null mice. **Key words:** Di(2-ethylhexyl)phthalate, *Pparα*-null mouse, Tumorigenesis, NFκB, 8-OHdG, c-jun, Inflammation

**EFFECTS OF LIFESTYLE ON URINARY 1-HYDROXYPYRENE CONCENTRATION.** This study aimed to clarify the variation of urinary excretion of 1-hydroxypyrene, which is a major metabolite of pyrene, in relation to lifestyle, including factors such as diet and smoking. The study subjects were 251 workers (male: 196, female: 55, mean age: 44.3) who were not occupationally exposed to PAHs. Urine specimens were collected from 8:00 a.m. to 11:00 a.m. and their 1-hydroxypyrene concentrations were determined by HPLC. A questionnaire was distributed in order to learn gross aspects of the subjects' lifestyles, i.e., smoking, alcohol consumption, coffee/black tea intake, and dietary habits. Multiple linear regression analysis revealed that cigarette consumption most strongly affected the 1-hydroxypyrene level in urine, followed by dietary balance. The urinary 1-hydroxypyrene concentrations of smokers were about 2 times higher than those of non-smokers. Subjects who ate more meat and/or fish excreted 1.5–2 times more 1-hydroxypyrene in urine than those who ate more vegetables. **Key words:** 1-Hydroxypyrene, Smoking, PAH (polyaromatic hydrocarbon), Biological monitoring, Biomarkers, Dietary balance, Meat, Vegetable, Fish, Alcohol

**EFFECTS OF AN EDUCATION PROGRAM FOR STRESS REDUCTION ON SUPERVISOR KNOWLEDGE, ATTITUDES, AND BEHAVIOR IN THE WORKPLACE: A RANDOMIZED CONTROLLED TRIAL.** Supervisors at work play a large role in stress management at the workplace. Providing supervisors with necessary information and useful skills might be one effective approach that will lead to stress reduction. However, very few studies have investigated the effect of supervisor education by using a rigorous study design. In a randomized controlled trial, we tried to clarify how an education program for stress reduction influences supervisor knowledge, attitudes, and behavior concerning stress management. The subjects were 46 supervisors of an old, established sake brewery manufacturer of 301 employees. The supervisors were assigned to either the intervention group (24 supervisors) or the control group (22 supervisors). We conducted a single-session education program that included the guidelines for worker mental health promotion to the intervention group. The education program was composed of a basic education lecture and active listening training. The effects of this program on supervisor knowledge, attitudes, and behavior were measured using an original, self-administered questionnaire. The intervention effect was tested by examining an interaction effect between groups and time (before education, three and six months after education). The education favorably affected supervisor knowledge ( $F=7.92$ ;  $p=.001$ ). As for behavior, the intervention effect was marginally statistically significant ( $F=2.51$ ;  $p=.088$ ). For the attitude score, however, there were no beneficial effects. In conclusion, the provision of necessary information and useful skills to supervisors seems to improve supervisor knowledge and behavior regarding stress management at the workplace for at least six months. **Key words:** Mental health promotion, Supervisor, Education program, Stress reduction, Knowledge, Attitude, Behavior

**EVALUATION OF THE EFFECT OF HEAT EXPOSURE ON THE AUTONOMIC NERVOUS SYSTEM BY HEART RATE VARIABILITY AND URINARY CATECHOLAMINES**. The aim of this study was to investigate the usefulness of heart rate variability (HRV) and urinary catecholamines (CA) as objective indices of heat stress effect. We examined physiological responses, subjective symptoms, HRV and urinary CA to evaluate the effect of heat exposure on the autonomic nervous system. Six healthy male students volunteered for this study. They were exposed on different days to either a thermoneutral condition at wet bulb globe temperature (WBGT) 21°C, or a heated condition at WBGT 35°C for 30 min, while seated on a chair. In the thermoneutral condition, differences of all parameters between the values before and after 30 min exposure were not statistically significant. In the heated condition, heart rate, body temperature and scores for subjective symptoms (feverishness, sweating, mood, and face flushing) significantly increased after 30 min exposure ( $p<0.05$ ). Also, the high frequency component (HF%) of HRV significantly decreased and the low frequency/high frequency (LF/HF) ratio of HRV significantly increased after 30 min exposure to the heated condition ( $p<0.05$ ). There were no significant differences between the amounts of urinary CA before and after the 30 min exposures; however, the norepinephrine amount after 30 min exposure to the heated condition was significantly greater than that of the thermoneutral condition ( $p<0.05$ ). The heat exposure (WBGT 35°C) induced activation of the sympathetic nervous system and a withdrawal of the parasympathetic nervous system. These findings coincide with observed changes of heart rate, body temperature and subjective symptoms. It is suggested that HRV (HF% and LF/HF ratio) and urinary norepinephrine may be useful objective indices of heat stress; HRV seems to be more sensitive to heat stress than urinary CA. **Key words:** Heat exposure, WBGT, Autonomic nervous system, Heart rate variability, Urinary catecholamines

**PLASMA N-3 POLYUNSATURATED FATTY ACID AND CARDIOVASCULAR DISEASE RISK FACTORS IN JAPANESE, KOREAN AND MONGOLIAN WORKERS.** The favorable role of n-3 polyunsaturated fatty acid (PUFA) in cardiovascular disease (CVD) has been demonstrated in animal experiments and in humans in Western countries, but its effect remains controversial in Asian populations. An observational study of Japanese, Koreans and Mongolians with extended histories of remarkably different frequencies of fish intake was conducted to examine whether differences in plasma n-3 PUFA affects CVD risk factors. We conducted a cross-sectional study in workplace settings and determined body mass index (BMI), blood pressure, total cholesterol, LDL-cholesterol, HDL-cholesterol, triglyceride (TG), glucose, insulin, homeostasis model assessment-insulin resistance (HOMA-IR) and fatty acid composition in plasma. A total of 411 Japanese, 418 Korean and 252 Mongolian workers aged 30–60 yr participated in this study. The Japanese ate fish more frequently and had remarkably higher values of eicosapentaenoic acid, docosahexaenoic acid and n-3 PUFA, and lower values of BMI and HOMA-IR, followed by the Koreans, and then the Mongolians. In age groups, the Japanese and Koreans showed a similar tendency of increase in n-3 PUFA with increasing age. General linear measurement multivariate analysis after adjustment for gender, age, smoking, drinking, exercise habits and BMI showed n-3 PUFA was associated with HDL-C and TG in the Japanese, while it was associated with systolic blood pressure in the Koreans, and TG in the Mongolians. In conclusion, an increase in

n-3 PUFA was associated with HDL-C and TG in the Japanese and Mongolians, but these beneficial effects were not constant across the three Asian ethnic groups. **Key words:** n-3 PUFA, Fish, Triglyceride, HDL-cholesterol, Insulin resistance, Asian

**HPLC-ICP-MS SPECIATION ANALYSIS OF ARSENIC IN URINE OF JAPANESE SUBJECTS WITHOUT OCCUPATIONAL EXPOSURE.** The toxicity and carcinogenicity of arsenic depend on its species. Individuals living in Japan consume much seafood that contains high levels of organoarsenics. Speciation analysis of urinary arsenic is required to clarify the health risks of arsenic intake. There has been no report of urinary arsenic analysis in Japan using high performance liquid chromatography with inductively coupled plasma mass spectrometry (HPLC-ICP-MS). We performed speciation analysis of urinary arsenic for 210 Japanese male subjects without occupational exposure using HPLC-ICP-MS. The median values of urinary arsenics were as follows: sodium arsenite (AsIII), 3.5; sodium arsenate (AsV), 0.1; monomethylarsonic acid (MMA), 3.1; dimethylarsinic acid (DMA), 42.6; arsenobetaine (AsBe), 61.3; arsenocholine, trimethylarsine oxide, and unidentified arsenics (others), 5.2; and total arsenic (total As), 141.3  $\mu\text{gAs}/\text{l}$ . The median creatinine-adjusted values were as follows: AsIII, 3.0; AsV, 0.1; MMA, 2.6; DMA, 35.9; AsBe, 52.1; others 3.5; and total As, 114.9  $\mu\text{gAs/g}$  creatinine. Our findings indicate that DMA and AsBe levels in Japan are much higher than those found in Italian and American studies. It appears that the high levels of DMA and AsBe observed in Japan may be due in part to seafood intake. ACGIH and DFG set the BEI and BAT values for occupational arsenic exposure as 35  $\mu\text{gAs}/\text{l}$  and 50  $\mu\text{gAs}/\text{l}$ , respectively, using the sum of inorganic arsenic (iAs), MMA, and DMA. In the general Japanese population, the sums of these were above 50  $\mu\text{gAs}/\text{l}$  in 115 (55%) samples. We therefore recommend excluding DMA concentration in monitoring of iAs exposure. **Key words:** Arsenic, Urine, Speciation, HPLC-ICP-MS, Japanese

**"HOW FATIGUED DO YOU CURRENTLY FEEL?" CONVERGENT AND DISCRIMINANT VALIDITY OF A SINGLE-ITEM FATIGUE MEASURE.** The main aim of this study was to establish the convergent and discriminant validity of a single-item measure of daily fatigue ("How fatigued do you currently feel?") in a daily diary context. Convergent validity of our measure was examined by relating it to a validated multiple-item measure of fatigue (Profile of Mood States; McNair, Lorr, & Droppelman, 1971) and to other daily (work-home interference, sleep complaints, work-related effort) and global (fatigue, health complaints, work-home interference, job pressure) measures that are conceptually related to fatigue. Discriminant validity was assessed by relating the single-item fatigue measure to daily (work pleasure) and global (job control, social support, motivation to learn) measures that are conceptually distinct from fatigue. Data were collected among 120 academic staff members, who completed a general questionnaire (tapping the global measures under study) and who took part in a 9-d daily diary study (3 measurements daily). Correlation patterns and multilevel analyses revealed strong and significant associations between the single-item fatigue measure and the variables incorporated to assess convergent validity (especially with the POMS:  $r=0.80$ ), thus supporting the convergent validity of our measure. Relations with variables included to examine discriminant validity were weak or insignificant, supporting the discriminant validity of the single-item fatigue measure. Despite this study's limitations (i.e., exclusive use of self-reporting, specific sample) we conclude

that this single-item fatigue measure offers a valid way to assess daily fatigue. **Key words:** Fatigue, Academics, Validity, Diary study

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MAPFRE SEGURIDAD – Fundación MAPFRE

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CONTENIDO:

[\*\*LA EXPOSICIÓN LABORAL A AGENTES QUÍMICOS CANCERÍGENOS\*\*](#) / Alba Hidalgo, Miguel Ángel. En mayo se cumplen diez años de la aparición del Real Decreto 665/1997, de 12 de mayo, sobre la protección de los trabajadores contra los riesgos relacionados con la exposición a agentes cancerígenos durante el trabajo. Este Real Decreto no ha sido la primera normativa específica orientada a prevenir los cánceres de origen laboral pero sí la primera referencia legal que, con posterioridad a la Ley 31/1995 de prevención de riesgos laborales, aporta los principios generales para la lucha contra los cánceres profesionales. Aún hoy se plantean dudas y controversias acerca del tratamiento del riesgo generado por estos agentes químicos. En estas páginas se repasa la situación actual del tema y se aportan algunas pautas con el fin de facilitar una adecuada prevención y protección frente a la exposición laboral a los agentes químicos cancerígenos.

[\*\*PROYECTO DE NORMA EN 45545 DE SEGURIDAD CONTRA INCENDIOS EN VEHÍCULOS FERROVIARIOS\*\*](#) / Capote Abreu, Jorge A., Alvear Portilla, Daniel, Quintana Lavín, Borja. El proyecto de norma europea EN 45545 está llamado a ser un elemento clave en el campo de la seguridad contra incendios para el futuro del transporte ferroviario de pasajeros en Europa. En este artículo se describe este proyecto que, conjugando factores como el diseño del vehículo o una novedosa selección de materiales, pretende elevar la seguridad de los pasajeros en caso de incendio en un tren.

[\*\*MÉTODO PARA LA PREVENCIÓN DE RIESGOS LABORALES DE LAS QUEMAS CONTROLADAS Y LOS CORTAFUEGOS\*\*](#) / Pous Andrés, Enric, Molina Terrén, Domingo. El uso profesionalizado y especializado del fuego como herramienta para prevenir o extinguir incendios forestales es muy reciente, y todavía faltan por estudiar y definir aspectos de esta actividad como los relativos a la seguridad y la salud laboral. Este artículo propone una metodología para planificar la prevención de riesgos laborales de estas técnicas forestales, caracterizando las tareas y puestos de trabajo posibles de esta actividad, así como los riesgos asociados que conlleva y las medidas preventivas necesarias para desempeñar esta labor de la forma más segura posible.

[\*\*EL PROCESO DE BOLONIA, CLAVE PARA ELEVAR LA PREVENCIÓN DE RIESGOS LABORALES A CARRERA UNIVERSITARIA\*\*](#) / Rubio Romero, Juan Carlos. El proceso de convergencia del Espacio Europeo de Educación Superior, el llamado proceso de

Bolonia, se perfila como una gran oportunidad para poner de una vez orden en la formación de nivel superior de los técnicos en Prevención de Riesgos Laborales (PRL), que hasta ahora carecen de una titulación oficial universitaria propia. Este reportaje refleja las reformas educativas europeas en curso y describe las posibilidades para establecer una titulación universitaria en este ámbito.

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**OBJECTIF PRÉVENTION: LA REVUE D'INFORMATION** - L'Association paritaire pour la santé et la sécurité du travail du secteur affaires sociales (ASSTSAS)

EJEMPLAR: vol. 30, no. 3, 2007

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CONTENIDO:

**MOT DE L'ASSOCIATION – INTERVENIR EN PRÉVENTION DES AGRESSIONS.** L'ASSTSAS s'intéresse depuis longtemps et intensément au problème des agressions vécu dans le secteur de la santé et des services sociaux. Dans ce numéro, nous vous proposons des solutions modulées en fonction des risques et du contexte de travail. Comme vous le verrez, ces solutions peuvent être des plus souples (ex. organisation du travail, contexte clinique, Approche relationnelle de soins, Pacification des états de crise aiguë) aux plus encadrantes (ex. mesures judiciaires, détecteurs de métals, Oméga, code blanc).

**DOSSIER : LA VIOLENCE AU TRAVAIL.** La violence est malheureusement trop présente dans les milieux de travail du secteur de la santé et des services sociaux: les agressions et la violence, celles des clients à l'endroit du personnel ou, encore, dans les interventions avec les proches des clients. Ce dossier relate des expériences d'établissements qui ont agi en vue d'assurer la santé et la sécurité de leurs travailleurs. Aménagement des lieux, équipe d'intervention, programme antiviolence, formation des travailleurs, sont des réalisations qui ont générée des conséquences positives sur la prévention des agressions.

- [\*\*DOSSIER VIOLENCE AU TRAVAIL – PRÉVENTION DE LA VIOLENCE À LA SOURCE DANS UN CENTRE JEUNESSE.\*\*](#) Pour son unité d'hébergement des 6-12 ans présentant de multiples problématiques, le Centre jeunesse (CJ) du Bas-Saint-Laurent s'est donné un processus de gestion de la violence complètement différent. Gaston Pouliot nous raconte le déroulement de cette expérience.
- [\*\*DOSSIER VIOLENCE AU TRAVAIL – UNE ÉQUIPE DE CODE BLANC AU DOUGLAS.\*\*](#) La violence et les agressions sont des réalités très importantes depuis toujours. Elles concernent tout le monde. Pour le personnel de l'Institut universitaire en santé mentale Douglas (centre de services spécialisés et surspécialisés en santé mentale), travailler dans un milieu sécuritaire est une préoccupation constante.
- [\*\*DOSSIER VIOLENCE AU TRAVAIL – DES SOLUTIONS QUI FONT LA DIFFÉRENCE!\*\*](#) La gestion des situations présentant un potentiel de violence n'est jamais facile. Ce

l'est encore moins lorsque les milieux de travail sont répartis dans la communauté comme au Centre de réadaptation en déficience intellectuelle (CRDI) de Québec. Innovation, ouverture et créativité entrent en jeu pour trouver des solutions qui font une grande différence!

- **DOSSIER VIOLENCE AU TRAVAIL – REPÈRES POUR AMÉNAGER UN BUREAU DE TRAVAIL SÉCURITAIRE.** En matière de prévention des agressions, quels critères d'aménagement respecter afin de rendre sécuritaire un bureau de travail? Bien qu'il y ait peu d'écrits à ce sujet, la variété des configurations possibles des bureaux dans les établissements du secteur permet de tracer des lignes directrices.
- **DOSSIER VIOLENCE AU TRAVAIL – RÉUSSIR UN PROGRAMME ANTIVIOLENCE.** Arrêtons-nous quelques instants pour bien cibler les conditions de réussite d'un programme antiviolence. Tout d'abord, il faut dresser le portrait de la situation pour connaître l'ampleur du problème. Demandons-nous où, quand, comment, pourquoi, et avec qui survient le problème.
- **DOSSIER VIOLENCE AU TRAVAIL – POLITIQUES CONTRE LA VIOLENCE: ÉVITONS LES CASSE-TÊTE!** À moins qu'il ne s'agisse de votre champ de spécialité professionnelle, se voir confier la conception d'une politique d'établissement est un défi qui occasionne sa part d'anxiété et de tâtonnement. À plus forte raison quand le thème de ladite politique est un sujet délicat et parfois confondant comme la violence. Il y a dix ans, nous publions un article intitulé *Produire une politique contre la violence, quel casse-tête!* Aujourd'hui, nous vous le proposons de nouveau dans sa version 2007.

**QUALITÉ DE L'AIR – FUMÉE DE TABAC ENVIRONNEMENTALE: 1. AMÉNAGEMENT D'UN FUMOIR.** En mai 2006, sont entrées en vigueur plusieurs modifications à la *Loi sur le tabac et les produits du tabac* adoptée en juin 1998. La loi envoie évidemment le message que non seulement fumer est nocif, mais aussi respirer la fumée de tabac environnementale. Cependant, dans certaines circonstances et selon certaines conditions, un fumoir peut être aménagé dans un établissement du secteur.

**QUALITÉ DE L'AIR – FUMÉE DE TABAC ENVIRONNEMENTALE: 2. APPAREIL DE PROTECTION RESPIRATOIRE.** Depuis la *Loi sur le tabac*, de nombreux travailleurs ne sont plus exposés à la fumée de tabac environnementale (FTE), soit parce que leur établissement est un environnement sans fumée, soit parce que leurs tâches s'effectuent dans les lieux exempts de FTE. Mais qu'en est-il des autres travailleurs qui demeurent exposés?

**PROTECTION RESPIRATOIRE – RÉSERVE PROVINCIALE D'APR N-95, QUELQUES PRÉCISIONS!** Le secteur de la santé et des services sociaux se prépare avec sérieux à une éventuelle pandémie d'influenza. Des équipements critiques ont été identifiés par le ministère de la Santé et des Services sociaux (MSSS), dont les appareils de protection respiratoire (APR) N-95. La création d'une réserve provinciale de ces équipements suscite bien des questions. Nous tentons d'y répondre ici.

**POUR EN SAVOIR PLUS – UN CHOIX D'OUTILS FACE AUX AGRESSIONS.** Les interactions difficiles avec des clients agressifs ne surviennent pas que dans le secteur de la santé et des services sociaux. Comme elles sont présentes dans tous les milieux de travail, des outils d'intervention ont été développés par différents organismes dont des

associations sectorielles paritaires (ASP) en SST pour venir en aide à leurs membres. En voici quelques-uns que vous pouvez adapter à votre contexte de travail.

**SANTÉ PSYCHOLOGIQUE – LE BIEN-ÊTRE AU TRAVAIL, UTOPIE OU BON SENS?** Au début des années 2000, le Centre de réadaptation Estrie (CRE) vit un manque de personnel. Cette pénurie amplifie le problème des listes d'attente. La direction choisit de se mettre en mode proactif et cherche une voie pour améliorer la rétention et le recrutement de son personnel, l'objectif ultime étant de maintenir la qualité de ses services et leur accessibilité.

**CONTENTIONS – DES ÉQUIPEMENTS POUR RÉDUIRE LES RISQUES RELIÉS AUX CHUTES CHEZ LES CLIENTS.** Cet article complète un texte publié dans *Objectif prévention* sur la réduction des contentions utilisées avec certaines personnes âgées en centre d'hébergement et de soins de longue durée (CHSLD). Il présente différents équipements utilisés, ou en voie de l'être, au Manoir de la Pointe-Bleue.

**RÉGLEMENTATION – MODIFICATIONS DU RSST, CUVÉE 2007.** Le 9 janvier 2007, le *Règlement sur la santé et la sécurité du travail (RSST)* a fait l'objet de modifications. Puisque le RSST s'applique aux établissements du secteur, nous sommes bien évidemment concernés par ces derniers développements. Intéressons-nous donc aux principaux changements, d'abord pour s'informer et ensuite pouvoir se conformer aux nouvelles exigences en vigueur.

**VITRINE DES NOUVEAUTÉS – LES SACS HYGIÉNIQUES.** Dans cette chronique, nous vous informons de la présence sur le marché de produits susceptibles d'améliorer les conditions de santé et de sécurité des travailleurs du secteur. L'ASSTSAS sélectionne les produits qui vous sont présentés pour leur apport à l'élimination de contraintes ou de dangers. Dans ce numéro, de tout nouveaux sacs hygiéniques vous sont présentés.

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PERSPECTIVES INTERDISCIPLINAIRES SUR LE TRAVAIL ET LA SANTÉ  
(PIESTES)

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IDIOMA: francés (resumen en español)

CONTENIDO:

[Editorial / Esther Cloutier](#)

RECHERCHE

**CONDITIONS ET PROCESSUS MENANT À DES CHANGEMENTS À LA SUITE D'INTERVENTIONS EN SANTÉ ET EN SÉCURITÉ DU TRAVAIL : L'EXEMPLE D'ACTIVITÉS DE FORMATION** / Geneviève Baril-Gingras, Marie Bellemare et Jean-Pierre Brun. Utilizando como ejemplo las actividades de formación, este artículo trata de las condiciones y procesos que conducen a los cambios que siguen las intervenciones en salud y seguridad en el trabajo (SST). Se realizaron observaciones y entrevistas durante las intervenciones de cuatro consejeros de las asociaciones sectoriales paritarias en SST. Tres dimensiones del contexto influencian los cambios: el grado previo de desarrollo de las actividades de prevención; la presencia de actores que pueden servir de «relevo»

y de "maestros de obra" y la presencia de características de la situación que son favorables. La colaboración pasada con el organismo consejero contribuye a las dos primeras, sugiriendo el interés de un seguimiento continuo por parte del organismo de prevención. Diferentes estrategias son desplegadas para desarrollar las capacidades que faltan y para revelar los factores favorables. Observamos diversos procesos que conducen a cambios: una transformación de la representación que tienen los trabajadores en cuanto a su capacidad de actuar, la legitimación de su acción sobre los riesgos, el compartir la experiencia en prevención; un proceso colectivo de resolución de problemas. *Keywords:* formación, intervención, estudio cualitativo, salud y seguridad en el trabajo

[Temps de travail et organisation du travail : une source de stress et de difficultés de conciliation emploi-famille?](#) / Diane-Gabrielle Tremblay, Elmustapha Najem et Renaud Paquet. Los datos que presentaremos proporcionan un retrato de la situación canadiense desde el punto de vista de la organización y de la reducción del tiempo de trabajo (ORTT), así como del lugar de trabajo (oficina, domicilio, etc.). Los datos muestran en qué medida el ORTT puede ser visto por algunos como una solución y por otros como una fuente de dificultades para los problemas de conciliación entre el empleo y la familia o de estrés. Hemos estudiado la situación tanto de los hombres como de las mujeres en situación de empleo y hemos preguntado si la presencia de las mujeres dentro de una organización o la de padres de familia trabajadores incita a las organizaciones a instaurar medidas de conciliación y de ORTT. Es interesante constatar que las personas sin hijos ocupan más frecuentemente empleos que ofrecen mayores servicios para personas de edad avanzada y para la guardería de niños. En lo que a la ORTT se refiere, mostramos que los comportamientos de las mujeres sin hijos se asemejan a los de los hombres, pero que la presencia de hijos es un factor fundamental para explicar las aspiraciones de los hombres en cuanto al tiempo de trabajo. Pocos estudios abordaron la problemática bajo este ángulo, y es interesante constatar que la presencia de hijos es a menudo más determinante que el hecho de ser mujer. Sin embargo, las mujeres se muestran claramente más implicadas cuando se trata de recurrir a servicios de guardería o de cuidados a las personas de edad avanzada. *Keywords:* conciliación trabajo-familia; empleo-familia; estrés; tiempo de trabajo; salud mental

[Apport de diverses sources de données à la réalisation d'une intervention ergonomique](#) / Marie St-Vincent, Denys Denis, Daniel Imbeau et François Ouellet. La investigación que presentamos es una reflexión de orden metodológico acerca del proceso de intervención en ergonomía. Su objetivo era el de precisar la contribución de nueve fuentes de datos a la realización de una intervención ergonómica. Se hizo un seguimiento a posteriori de una investigación de terreno en intervención cuyo objetivo era de reducir los trastornos músculo-esqueléticos (TME) en un depósito perteneciente a una cadena de comercio minorista. Se analizaron nueve fuentes de datos clásicamente utilizados en ergonomía: cuestionarios, datos de entrevistas y datos de observación. Los resultados muestran que las observaciones son más precisas y cubren un número más grande de temas. Las entrevistas, sin embargo, proporcionan más información. Las entrevistas individuales y las auto-confrontaciones son las más ricas en información porque permiten hacer más relaciones entre los diferentes temas

cubiertos. Las entrevistas contribuyen a la construcción social de la intervención y a la evolución de las representaciones de los participantes. Los datos de observación, por estar constituidos de cifras, tienen el poder de convencer al empleador sobre la gravedad de los diferentes problemas. La caracterización de las informaciones recogidas por las diferentes fuentes muestra que la mayoría son informaciones nuevas (54,7 %), mientras que el 34,6 % son precisiones y solamente el 11% son confirmaciones. De este modo, se sigue aprendiendo a través de las diferentes fuentes de datos. Debemos entonces considerar al diagnóstico ergonómico como algo que se precisa gradualmente a través de las diferentes fuentes de datos y de una construcción progresiva de la información a lo largo de la intervención. La conclusión hace un balance sobre el aporte de este estudio. Los autores estiman que el estudio aporta una reflexión en profundidad que permite precisar las principales características, ventajas y límites de las diferentes fuentes de datos en el contexto estudiado. Desde esta perspectiva, el estudio puede constituir un aporte importante para los ergónomos, profesionales de la intervención e investigadores. *Keywords:* metodología, fuentes de datos, diagnóstico ergonómico, observaciones, entrevistas

[La santé en danse contemporaine : un itinéraire en zone trouble](#) / Sylvie Trudelle, Sylvie Fortin et Geneviève Rail. Una gran mayoría de bailarinas y bailarines debe transigir con problemas de salud que afectan el desarrollo de sus actividades profesionales al punto de poner un fin prematuro a su carrera. A diferencia de la medicina de la danza que contribuye significativamente a los conocimientos sobre el funcionamiento del cuerpo de los bailarines, este artículo trata lo que está en juego a nivel sociocultural propio al medio de la danza contemporánea y que es susceptible de influenciar los discursos y las prácticas de salud en el medio de la danza. Nuestro estudio revela que los intérpretes reciben cotidianamente demandas contradictorias y deben, de este modo, conciliar las exigencias de un cuerpo sano, funcional y equilibrado con las exigencias de un cuerpo poético, capaz de abandonarse y de inventar, todo ello sin contar con una red de contención segura en lo que a condiciones de trabajo se refiere. *Keywords:* Salud, danza, género, constructivismo, estética

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