Correlation of Pulmonary Exposure to Diesel Exhaust Particle with Sleeping Brainwave

柴油引擎微粒和睡眠腦波變化之相關性評估

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Background

Previous studies found that diesel exhaust particle (DEP) causes cardiopulmonary disorders, but the relationship among DEP, alteration in brainwave, and entropy is still unknown.

Objectives

The objective of this study was to investigate the alteration in brainwave, especially the entropy, after acute exposure of DEP. Also, the effects of DEP on sleep quality were examined.

Material and methods

Electroencephalography (EEG) and Electromyography (EMG) were implanted in SD rats. Acute exposure of DEP and PBS (vehicle control) were conducted to determine the alteration in EEG pre- and post-exposure. Entropy of EEG was also determined.

Results and discussion

Acute exposure of DEP resulted in changes of brainwave, leading to alteration in percentages of rapid-eye-movement (REM) and non-REM (NREM). Additionally, change in entropy was observed, the entropy of PBS exposure was decreased in the first 2 hours and increased in 2-4 hours. Notably, the entropy result in DEP exposure showed distinct effects, increase in the first 2 hours and decrease in the following 2 hours. The result suggests that short-term brainwave is altered by DEP exposure.

Conclusions

Our results provide the association of DEP exposure with changes in sleeping stages and the different degrees of the entropy. Our results will be helpful for sleeping disorder and clinical medicine.

PAHs Enhance the Endotoxin-Induced Reactive Oxygen Species and Inflammation of Human Bronchial Epithelial Cells

多環芳香烴增強內毒素誘發人類支氣管上皮細胞活性氧化物生成與發炎反應

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Introduction/ Purpose

Polycyclic aromatic hydrocarbons (PAHs) produced from incomplete combustion or pyrolysis processes are found to be one of the Particulate Matter, PM2.5. In addition to their carcinogenic and mutagenic effects, PAHs, such as the major PAHs benzo(a)pyrene [B(a)P] may induce airway remodeling resulting in chronic asthma and chronic obstructive pulmonary disease (COPD). Oxidative stress is considered as a cause of airway remodeling, and the increase in reactive oxygen species (ROS) will augment inflammatory response resulting in the severity of COPD. On the other hand, increase in the PM2.5 concentration of air will elevate the rate of COPD acute exacerbation (COPDAE). From 70 to 80 percent of COPDAE are due to respiratory infections. The aim of this study was to investigate the effect of B(a)P on human bronchial epithelial cells and explore its relation to COPDAE.

Methods and Results

The PM2.5 was collected in the urban area of Kaohsiung city in Taiwan, and followed by analysis of its B(a)P levels. Cell culture results showed B(a)P could significantly elevate the levels of pro-inflammatory mediators tumor necrosis factor-α (TNF-α) and interleukin-6 (IL-6) in human bronchial epithelial cells. To find the possible mechanisms by which PM2.5 pollution induces lung injury, we use B(a)P to treat bronchial epithelial cells and evaluate its efficacy. We found that B(a)P increased oxidative stress and inflammatory cytokines expressions in human bronchial epithelial cells with a dose-dependent matter. Besides, the expression of TLR2, but not TLR3 and TLR4 was also increased. Pretreatment with B(a)P could significantly augment the endotoxin-induced expressions of TNF-α, IL-6 and IFNγ as well as the response of ROS production. Furthermore, B(a)P pretreatment could also significantly increase the endotoxin-induced phosphorylation/activation of NF-κB p65.

Conclusion

B(a)P can stimulate the ROS production and inflammation cytokines expression of human bronchial epithelial cells suggesting long-term exposure of PAHs may induce the chronic airway disease. In addition, the there is synergic effect of B(a)P with endotoxin that is worthy of notice for its relation to COPDAE.

Coarse Particulate Air Pollution Associated with Increased Risk of Hospital Admissions for Respiratory Diseases in a Tropical City, Kaohsiung, Taiwan

空氣中懸浮微粒濃度與呼吸道疾病住院關係之研究

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Introduction/ Purpose

This study was undertaken to determine whether there was an association between coarse particles ($PM_{2.5-10}$) levels and frequency of hospital admissions for respiratory diseases (RD) in Kaohsiung, Taiwan.

Methods

Hospital admissions for RD including chronic obstructive pulmonary disease (COPD), asthma, and pneumonia, and ambient air pollution data levels for Kaohsiung were obtained for the period from 2006 to 2010. The relative risk of hospital admissions for RD was estimated using a case-crossover approach, controlling for weather variables, day of the week, seasonality, and long-term time trends.

Results

For the single pollutant model (without adjustment for other pollutants), increased rate of admissions for RD were significantly associated with higher coarse PM levels only on cool days (<25 ℃), with a 10 μg/m³ elevation in $PM_{2.5-10}$ concentrations associated with a 3% (95% CI = 1%-5%) rise in COPD admissions, 4% (95% CI = 1%-7%) increase in asthma admissions, and 3% (95% CI = 2%-4%) rise in pneumonia admissions. No significant associations were found between coarse particle levels and the number of hospital admissions for RD on warm days. In the two-pollutant models, $PM_{2.5-10}$ levels remained significantly correlated with higher rate of RD admissions even controlling for sulfur dioxide, nitrogen dioxide, carbon monoxide, or ozone on cool days.

Discussion/ Conclusion

This study provides evidence that higher levels of $PM_{2.5-10}$ enhance the risk of hospital admissions for RD on cool days.

Short-Term Effect of Coarse Particles on Daily Mortality Rate in A Tropical City, Kaohsiung, Taiwan

懸浮微粒濃度與日死亡率關係之研究

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Introduction/ Purpose

Many studies examined the short-term effects of air pollution on frequency of daily mortality over the past two decades. However, information on the relationship between exposure to levels of coarse particles ($PM_{2.5-10}$) and daily mortality rate is relatively sparse due to limited availability of monitoring data and findings are inconsistent. This study was undertaken to determine whether an association exists between $PM_{2.5-10}$ levels and rate of daily mortality in Kaohsiung, Taiwan, a large industrial city with a tropical climate.

Methods

Daily mortality rate, air pollution parameters, and weather data for Kaohsiung were obtained for the period 2006-2008. The relative risk (RR) of daily mortality occurrence was estimated using a time-stratified case-crossover approach, controlling for (1) weather variables, (2) day of the week, (3) seasonality, and (4) long-term time trends.

Results

For the single-pollutant model without adjustment for other pollutants, $PM_{2.5-10}$ exposure levels showed significant correlation with total mortality rate both on warm and cool days, with an interquartile range increase associated with a 14% (95% CI = 5-23%) and 12% (95% CI = 5-20%) rise in number of total deaths, respectively. In two-pollutant models, $PM_{2.5-10}$ exerted significant influence on total mortality frequency after inclusion of sulfur dioxide (SO_2) on warm days. On cool days, $PM_{2.5-10}$ induced significant elevation in total mortality rate when SO_2 or ozone (O_3) was added in the regression model. There was no apparent indication of an association between $PM_{2.5-10}$ exposure and deaths attributed to respiratory and circulatory diseases.

Discussion/ Conclusion

This study provided evidence of correlation between short-term exposure to $PM_{2.5-10}$ and increased risk of death for all causes.

Indeno(1,2,3-cd)pyrene, one of Polycyclic aromatic hydrocarbons in air pollutant, enhances allergic lung inflammation

空氣汙染分子 Indeno(1,2,3-cd)pyrene 的吸入將增強過敏性肺部發炎

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Introduction/ Purpose

Poly aromatic hydrocarbons (PAHs) are common air pollutant. Previous studies are most focus on Benzo(a)pyrene (BaP), also known as a strong carcinogen. However, another molecule, Indeno[1,2,3-cd]pyrene (IP), also has a relative high concentration in polluted air. It raised our interest in the relationship between allergic asthma and IP exposure. IP was classified as group 2B (low risk of carcinogenesis) by international agency for research on cancer. IP has a hydrophobic chemical structure and it can be detected in polluted air and edible oil, which has a risk potential to health.

Methods

C67BL/6 mice bone marrow cells were cultured for 8 days with IP or methanol treatment and stimulated with LPS for 24 hours. In asthma model, IP was transferred into naïve C57BL/6 mice by intranasal. All mice received OVA on day 7 and then received daily 15-min exposure on days 18-20 with 3% OVA.

Results

We have found that IP could suppress the expression of co-stimulatory molecules such as CD40, CD80, CD86, MHC II and proinflammatory cytokines IL-6, IL-12 and TNF-α on DC. In our asthma model, mice were exposed to IP in a long term and low dose manner by intra-nasal. We found the OVA-specific IgE titer, lung eosinophils populations are significantly increased after IP treatment.

Conclusion

We believe inhale with indeno pyrene could promote immune system toward Th2 response in vivo and causing more severe allergic symptom and asthma.

Improving Indoor Air Quality at Residential Area

居家通風改善-改善室內空氣品質

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Introduction/ Purpose

綠建築與生態城市的議題，在近幾年國家計畫中相當熱門，不同於以往單純探討綠建築結構與節能，本文是進到室內討論整體室內通風改善與分析改善後之空氣品質，來達到最適合人類居住與舒適的環境。希望藉由居家個案深入探討並找出適當的解決方法，用來建構更好的室內空氣品質。

Methods

以個案居家內部整體流場與二氧化碳濃度分布的相關性開始，最後進行室內環境控制，藉由改變進出口的風速所形成的流場，改善室內二氧化碳的分布的狀況。

Results

結果顯示，以二氧化碳當空氣品質指標時，個案居家如果裝設風扇，會使二氧化碳濃度滯留於房間的大部分空間，而無法改善通風；如果裝設抽風機，則二氧化碳只會滯留於床的部分，相對人與進出口區得到改善，且為了增進通風效能，進行窗戶建構上的改造，更成功地降低了室內所有空間內的二氧化碳濃度。

Discussion/ Conclusion

流場結構對於二氧化碳濃度分布呈現正相關，我們證明在討論室內空氣品質的研究必須先了解室內流場結構，推得改善室內空氣品質也需由室內流場結構下手。

Study of antibiotic-resistance of *Aeromonas sobria* in water bodies of Taichung area

台中河川中具多重抗藥性親水氣單胞菌的類型與分佈

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Purpose: 本研究檢測台中地區河川水質，瞭解多重抗藥性親水氣單胞菌(*Aeromonas sobria*)的類型與分佈情形。

Methods: 分別於台中四大河川（綠川、柳川、梅川與麻園頭溪）的河川監測站點採取水樣。採樣後，塗抹於不含抗生素，以及含安必西林(Ampicillin, Ap)、卡那黴素(Kanamycin, Km)及四環素(Tetracycline, Tc)之 MacConkey (MAC)培養基上，計算菌落數量(CFU)，觀察菌落外觀，分析抗藥型態。然後，將 Ap^r,Km^r,Tc^r（r 代表具有抗藥性）菌株培養於 LA 培養盤，經過革蘭氏染色(Gram's stain)測試後，培養於生化培養基中，進行生化試驗及菌種鑑定。

Results: 四大河川的上、中、下游共計檢測 12 個監測站點水樣，有 6 個站點檢測出具有多重抗藥性 Ap^r,Km^r,Tc^r 的親水氣單胞菌。包含嗜水氣單胞菌(*Aeromonas hydrophila*)、豚鼠氣單胞菌(*Aeromonas caviae*)與溫和氣單胞菌(*Aeromonas sobria*)等三種，皆為具運動性(motile)的親水氣單胞菌。分佈於綠川上游與中游；柳川下游；梅川下游；麻園頭溪上游與中游。此次沒有檢測出不具運動性(nonmotile)的殺鮭產氣單胞菌(*Aeromonas salmonicida*)。

Discussion: 親水氣單胞菌是一種水域性的兼性厭氧細菌，革蘭氏陰性不產芽胞桿菌。可引起淡水魚類細菌性敗血症，造成魚類大量死亡，此菌也可引起人類腸胃炎、食物中毒及創傷感染，被認為是腸道致病菌之一。多重抗藥性的親水氣單胞菌已廣泛存在於台中河域，檢出率比具多重抗藥性的大腸桿菌(*Escherichia coli*)更多，對環境生態甚具威脅。研究結果突顯台中市應增加污水處理系統處理率之重要性。

Tumor protein p63 expression induced by zinc oxide nanoparticles in mice

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Inhaled zinc oxide nanoparticles (ZnNOPs) have high deposition rates in the alveolar region of the lung; however, the adverse health effects of ZnONP on the respiratory system are unclear. Here, pathobiological response of the respiratory system of mice intratracheal administration of ZnONP were investigated by combination of molecular and imaging (SPECT and CT) approach. Female BALB/c mice were administrated with a series of doses of 20-nm ZnONP compared with PBS control for a 24-h follow-up and a 28-d follow-up observation. Field emission-scanning electron microscopy and energy-dispersive X-ray microanalysis were firstly characterized the ZnONP. After 24 h, instilled ZnONP significantly increased lactic dehydrogenase (LDH) in BALF and 8-hydroxy-2'-deoxyguanosine (8-OHdG), caspase-3 and tumour marker p63 in the lung tissues ($p<0.05$). The airway inflammation presented in a dose-dependent manner from upper to lower airway analysed by the SPECT. After 28 days, p63 was significantly increased by ZnONP in the lung tissues ($p<0.05$) with pulmonary inflammatory infiltration mainly occurred at the end of secondary bronchial bifurcation observed by CT. Our results demonstrated that acute lung injury was occurred by ZnONP exposure. We also observed that p63 was consistently over-expressed after 24 hours and 28 days of ZnONP exposure, suggesting p63-related tumoursuppressor pathways may be important in respone of ZnNOP in healthy mice. This work provides unique findings on the p63-related tumour suppressor pathways in response of ZnONP, which could be important in the study of pulmonary toxicity and reparing.

Keywords:apoptosis, inflammation, nanoparticle, oxidative stress, thyroid transcription factor-1, tumor protein p63.

Aryl hydrocarbon receptor regulates histone deacetylase 8expression to repress tumor suppressive activity in hepatocellularcarcinoma

芳烴受體調節組蛋白脫乙酰酶8表現去抑制抑癌基因的活性並促進肝腫瘤形成

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Background & Aims

Histone deacetylase 8 (HDAC8), a unique member of class I histone deacetylases,shows remarkable correlation with advanced disease stage and multiple malignanttumors However, little is known about the contribution of HDAC8 to the tumorigenesisof hepatocellular carcinoma (HCC).The present study investigated the expression ofHDAC8 regulated by the aryl hydrocarbon receptor (AHR) in HCC cell lines and tissues,and the roles of HDAC8 overexpression in cell proliferation, including potentiallyunderlying mechanisms.

Methods

We assessed the correlation between the clinic-pathologicalparameters and the expression of AHR and HDAC8. Further, we analyzed the AHRsiRNA transfection and HDAC8 inhibitors to explore the functions of HDAC8 in HCCprogression in vitro and in vivo. In a panel of 289 HCC patients, HDAC8 was shownto be highly correlated with AHR expression at both mRNA and protein levels.

Results

HCCpatients with high AHR expression showed a shorter survival time than that withlow AHR expression. We then found that the expression of both AHR and HDAC8was significantly upregulated in both HCC cell lines and tumor tissues compared tohuman normal hepatocytes and matched non-tumor tissues. Furthermore, HDAC8inhibition remarkably inhibited hepatoma cell proliferation and transformation activityvia upregulation of RB1 *in vitro* and *in vivo*.

Conclusions

Our data revealed an important role ofthe AHR-HDAC8 axis in promoting HCC tumorigenesis, thus identifying HDAC8 as apotential therapeutic target for HCC treatment.

Perfluoroalkyl substances and thyroid hormones in cord blood

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Background

Perfluoroalkyl substances (PFAS) are highly accumulative pollutants in environment and life creatures. However, both animal and human studies have focused on thyroid function, and these studies are controversial.

Methods

In total, 118 mother-infant pairs were collected from the Taiwan Birth Panel Study (TBPS). Cord blood PFAS levels were analyzed using the Waters ACQUITY UPLC system coupled with a Waters Quattro Premier XE triple quadrupole mass spectrometer. Cord blood thyroid hormones were assessed using the Roche Analytics E170 modular analyzer (Roche Diagnostics, Mannheim, Germany). PFAS concentrations were analyzed in the final models to examine the association between cord blood PFAS and thyroid hormone concentrations.

Results

We found that cord blood thyroid hormones were affected by PFAS. There were a negative association between T4 and PFOS, and a positive association between TSH and PFOS. Causal associations of thyroid hormones and PFAS are needed further exploration.

Keywords: perfluoroalkyl substances, thyroid hormone, cord blood

Phthalate Exposure in Relation to Serum Thyroid Hormones, Insulin-Like Growth Factor I in Taiwanese: Taiwan Environmental Survey for Toxicants (TESTs) 2013

塑化劑暴露與甲狀腺素和生長因子之相關性:2013 年台灣環境毒物監測雲

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Introduction/ Purpose

A few epidemiological studies have reported that exposure to phthalates may affect thyroid hormone homeostasis or growth among different age groups. We aim to explore the relationships between concentrations of urinary phthalate metabolites, thyroid function and serum insulin-like growth factor I (IGF-1) among a representative sample of Taiwanese adults and minors after the 2011 Taiwan food scandal.

Methods

We recruited 358 general Taiwanese, including 279 adults and 79 minors (<18 years), who provided serum and urine samples from 11 cities in 2013. We determined urinary levels of 11 phthalate metabolites using on-line LC/MS-MS, and measured serum levels of thyroxine (T4), free T4, triiodothyronine, thyroid-stimulating hormone, thyroxine-binding globulin, IGF-1 and its binding protein 3 (BP-3) using immunoassay. We applied multivariable linear regression models to examine these associations after adjustment of covariates.

Results

We found significant inverse associations between levels of urinary mono-(2-ethyl-5-hydroxyhexyl) phthalate (MEHHP)/ sum of urinary di(2-ethylhexyl) phthalate metabolites (∑DEHPm) and T4 in adults (MEHHP：β=-0.028; p=0.043; ∑DEHP：β=-0.045; p=0.017) or between levels of urinary monoethylhexyl phthalate (MEHP)/mono-(2-ethyl-5-oxohexyl) phthalate (MEOHP) and free T4 (MEHP ： β=-0.013; p=0.042;MEOHP：β=-0.030; p=0.003), respectively, after adjustment for age, BMI, gender, and TBG levels. We found significant positive association between urinary MEHP levels and IGF-1 levels (β =0.033, p=0.006) after adjustment for age, BMI, gender, and IGFBP-3. Among minors, we found significant negative association between levels of∑DEHPm and IGF-1 (DEHP: β =-0.166; p=0.041) after adjustment for age, BMI, gender, and IGFBP-3.

Discussion/ Conclusion

DEHP exposure may negatively alter thyroid hormones in adults and IGF-1 levels in minor after adjustment for relevant covariance. Large-scaled and mechanism studies are needed to confirm these associations.

Does Risk of Subclinical Hepatic Injury Increased with Urinary Thiodiglycolic Acid level in Children nearby a Petrochemical Complex?

石化區附近兒童尿液中硫代二乙酸是否增加亞臨床肝臟損傷之風險?

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Introduction/ Purpose

Previous studies have revealed a higher exposure level of urinary thiodiglycolic acid (TDGA), a major metabolite of vinyl chloride monomer (VCM), in school-aged children nearby a petrochemical complex in central Taiwan. However, no study assesses the risk of hepatic injury of children exposed to VCM or its major metabolite. We aim to assess the risk of hepatic injury in school-aged children using urinary TDGA nearby a petrochemical complex.

Methods

We included 316 children (aged 7-13 years old) who provided blood and urine samples from an established cohort in 2013. First morning urine and blood samples were obtained from each subject on Wednesday from October 2013 to September 2014. Urinary TDGA was analyzed by LC/MS-MS. Serum sample was analysis for hepatic injury index including aspartate aminotransferase (AST), AST to platelet ratio index (APRI) and fibrosis-4 score (FIB-4).

Results

We found that children with the highest quartile (Q4, >160 μg/g creatinine) of urinary TDGA level had significant higher AST levels than that in the lowest quartiles (Q1, <35 μg/g creatinine) (p=0.03). We found that our subject with Q4 of urinary TDGA level significantly had a 2.47-fold risk of subclinical AST abnormal than that with Q1 (OR = 2.47; 95% CI: 1.06 ~ 5.73, p = 0.036) after adjustment for age, gender, BMI, cholesterol, exercise, passive smoking and family income.

Discussion/ Conclusion

We concluded that higher TDGA exposure in school-aged children near a petrochemical complex was significantly associated with increased risk of subclinical AST abnormal after adjustment for significant covariance. Long-term follow-ups for these children are recommended to confirm these associations.

Association between prenatal arsenic exposure and adipokine levels in children form a 12-year follow-up birth cohort study

出生前砷暴露與孩童脂肪激素濃度之關聯-12 年出生世代研究

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Background: Arsenic (As) exposure was associated with increased risk of metabolic syndrome (MetS). However, less study has examined the effects of prenatal arsenic exposure on MetS nor adipokine in children. Adiponectin is an important adipokine and protective biomarker from atherosclerosis. We investigated the association between prenatal arsenic exposure and adipokine levels in children from a longitudinal follow-up birth cohort study.

Methods: We recruited 430 pregnant women from central Taiwan from 2000 to 2001 and assessed their children at birth, 2, 5, 8, and 11 years of age. We studies children with at least one measurement for both maternal arsenic and adipokine levels during each any of the follow-up time point (n = 245). Leptin and adiponectin were measured from child venous blood. Four arsenic species, including arsenite (AsIII), arsenate (AsV), monomethylarsonicacid (MMA), dimethylarsinicacid (DMA), were measured in maternal urine collected during the 3rd trimester. Mixed effect model analysis with repeated measures was used to estimate associations between arsenic species and adipokine levels.

Results: Maternal urinary MMA and MMA/inorganic As ratio were negative associated with childhood adiponectin levels after adjustment for children sex and maternal age and weight gain during pregnancy (β [95% CI] = -0.094 [-0.149 to -0.040], p = 0.001; -0.071 [-0.130 to -0.011], p = 0.021, respectively). Maternal urinary DMA ratio (DMA/MMA) was positively associated with childhood adiponectin levels (β [95% CI] = 0.111 [0.050 to 0.171], p = 0.001). We then grouped maternal arsenic concentrations by quartile. A significant does-response effect was also observed for maternal urinary MMA concentration, MMA ratio, and DMA ratio on childhood adiponectin levels (P_{trend} = 0.005 for MMA, 0.045 for MMA ratio, and 0.002 for DMA ratio, respectively).

Conclusion: Our results showed that prenatal inorganic As exposure was associated with decreased adipokine levels and metabolism capability with increased adiponectin in children.

Comparing Methylmercury Risk Estimated by Internal and Seafood Consumption Exposurein Children

以孩童血中濃度與海鮮攝食含甲基汞暴露估計之健康關注

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Introduction/Purpose

Mercury in aquatic environments can be transformed into methylmercury (MeHg), which is far more toxic to humans than inorganic form. The major source of human exposure to MeHg may be via consumption of fish and seafood. The neurotoxic effects of the infant and children up to 17 years of age were particularly profound and of great concerns for MeHg exposure. Biomonitoring data has been approved to be an important resource for identifying the presence of MeHg in human population. The purpose of this study was to compare hazard index (HI) based on the internal and seafood consumption exposure estimates among children.

Methods

We focused on risk assessment of internal and seafood consumption exposures to MeHg. For internal exposure, around 150 subjects were randomly drawn from the National Nutrition and Health Survey in Taiwan for 2005-2008. The blood specimens were obtained at the time of the physical examination. Red blood cell (RBC) was used to analyze total mercury (THg) concentration by using cold vapor atomic absorption spectroscopy. A toxico-kinetic model is developed to estimate the MeHg body burden in children. In addition, the data of fish and seafood consumption exposure were collected from published studies and the National Food Consumption database in Taiwan to assess ingestion MeHg levels from fish and seafood. Moreover, the MeHgbioaccessibility in different cooking methods was also considered in this study to assess effects of cooking methods on ingestion MeHg levels from fish and seafood in children. Finally, the HIs used to assess the potential neurodevelopmental risk on internal and seafood consumption exposure in children.

Preliminary results

The preliminary results indicated that (i) estimated median intake doses of MeHg in saltwater fish were the highest for 0-3 years old, following by 4-6 and 7-12 years old, and (ii) estimated median HI based on RBC-THg were higher in 7-12 than 13-18 years old children.

Conclusion

We will further examine the THg in bloodand estimate the seafood consumption varied with different cooking methods in children at the same year.

Phthalate exposure and Attention Deficit Hyperactivity Disorder traits in children's temperament: A 12-year follow-up study of a Taiwanese birth cohort

塑化劑暴露和兒童氣質中的過動與注意力缺乏特徵之相關性探討：出生世代之 12 年追蹤研究

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Introduction/ Purpose

Temperament is part of an individual's personality. Specific personality constellations are associated with increased incidences of behavioral problems. We hypothesized that early life exposure to phthalic acid ester (PAE) plasticizers, as endocrine disruptors, might affect children's temperaments.

Methods

Maternal-infant pairs (n = 208) completed child temperament evaluations at least once at 2, 5, and 11 years of age in 2000-2012. We measured seven PAE metabolites in the mother's and the children's urine using liquid chromatography-electrospray ionization-tandem mass spectrometry. These included mono-methyl phthalate (MMP), mono-ethyl phthalate (MEP), mono-butyl phthalate (MBP), mono-benzyl phthalate (MBzP), and 3 metabolites of di (2-ethylhexyl) phthalate (DEHP). We used generalized estimating equations to examine the relationship of the children's temperaments to the phthalate metabolite concentrations.

Results

Maternal phthalate metabolite concentrations were associated with lowered reaction intensity in boys after adjustment for potential confounders. Children's phthalate metabolite levels were significantly associated with a lowered threshold of responsiveness in both sexes, higher activity levels, and lowered persistence in girls. Children with MBzP over the median in both the prenatal and postnatal periods had the highest scores of withdrawal and a lowered threshold of responsiveness compared with the rest 3 groups with either or no higher exposure than the median in postnatal or prenatal periods.

Discussion/ Conclusion

Early life exposure to phthalates was associated with children's temperaments, particularly the temperament traits associated with attention deficit hyperactivity disorder (ADHD). Gender differences appeared in the effects of phthalate exposure on the children's temperaments.

Chromium Exposure with Co-exposure to Lead and Cadmium and Kidney Function in a National Survey in Taiwan

鉻與鉛、鎘的共同暴露對腎功能之影響

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Introduction/ Purpose

Environmental factors significantly contribute to the pathogenesis of chronic kidney disease; however, they are not comprehensively evaluated, particularly with regard to the toxic effects of heavy metals. Chromium is a widespread industrial contaminant, linked to nephrotoxicity in studies involving animals and occupational populations. However, its role in population renal health and the potential interactions with nephrotoxic metals, cadmium and lead, remain unknown.

Methods

In the final analysis of 360 Taiwanese adults, aged 19 to 84 years from the National Nutrition and Health Survey in Taiwan (2005-2008), we assessed the association between exposure to chromium, lead, and cadmium, and renal function estimated by the glomerular filtration rate.

Results

For every doubling of urinary chromium or lead, there was a significant decrease in glomerular filtration rate by -5.99 ml/min/1.73m^2 (95% CI -9.70, -2.27) and -6.61 (-9.71, -3.51), respectively, adjusting for age, sex, body mass index, hypertension, diabetes, cigarette smoking, sodium intake, education, urinary volume, and the other metals. Among participants in the highest tertile of cadmium exposure, the glomerular filtration rate decreased by -12.68 ml/min/1.73m^2 (95% CI -20.44, -4.93) and -11.22 ml/min/1.73m^2 (-17.01, -5.44), for each doubling of urinary chromium and lead level, respectively.

Discussion/ Conclusion

This study found a significant and independent association between chromium exposure and decreased renal function. The authors also demonstrated, for the first time that co-exposure to chromium, cadmium, and lead, is probably associated with a further decline in glomerular filtration rate in Taiwanese adults. A large-scale prospective study is required to further evaluate the effect of chromium exposure on renal function.

The association of early life arsenic exposure trajectory and lipid profile in adolescence: A 15-year longitudinal birth cohort study in Taiwan

嬰幼期至青少年間之無機砷暴露軌跡與血中脂肪濃度之相關性研究

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Introduction/ Purpose

The effect of inorganic arsenic on the developmental course of cardiovascular disease in early life remains unknown. We evaluated the association of early life arsenic exposure with the adolescent lipid profile in the Taiwan Maternal and Infant Cohort Study.

Methods

We studied 131 adolescents who were followed from before birth to adolescence with 5 waves of follow-up interview and examination at approximately 2, 5, 8, 11, and 14 years of age and with at least one follow-up urine measurement for arsenic species and blood sampled at 14 years of age. We used the sum (ΣAs) of arsenic species (arsenite, arsenate, monomethylarsonate and dimethylarsinate) and applied semiparametric mixture modeling to identify group-based trajectories of serial ΣAs. Main outcome measures were serum fasting total cholesterol (TC), triglyceride (TG), and low-density lipoprotein cholesterol (LDL-C), and high-density lipoprotein cholesterol (HDL-C) concentrations. Multiple linear regression was performed to assess the effect of postnatal arsenic exposure trajectory on lipid profile.

Results

Three trajectories of postnatal arsenic exposure were identified: stable low (30.5% of adolescents), rising to high (21.4%), and stable high (48.1%). Comparing with reference trajectory group (stable low), the increase in LDL-C and TC was 20.5 mg/dL (95% confidence interval 7.3-33.6) and 21.6 mg/dL (6.9, 26.3) for the group with “rising to high “ trajectory and was 14.1 mg/dL (2.7-25.5) and 11.6 mg/dL (-1.0, 24.3) for the group with “stable high” trajectory. The “rising to high” group was also associated with an increase in TC/HDL-C ratio, a atherosclerotic biomarker, by 0.47 (95% CI 0.11-0.83). Such association was not observed for HDL-C and TG with the postnatal arsenic exposure trajectory.

Discussion/ Conclusion

Our findings suggest LDL-C may be increased by environmental arsenic exposure at early stage of life. This may play certain in the increased risk of the cardiovascular disease related to arsenic.

Discussion on Establishing the Value-Added Services of Health Management in Health Management Center

健康管理中心建立健檢後健康管理加值服務之理念與做法

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目的

健檢是結合臨床醫學和預防保健的必要作為，可以達到「未病先防，有病早治」之目的。本文旨在闡述健康管理中心建立健檢後健康管理加值服務的理念、內涵及具體作法，延伸健檢服務於參檢人的健康管理與健康促進。

方法

借鑒現代健康管理模式，提出建立健檢後健康管理加值服務的具體作法。利用加值服務的資訊化平台延伸健檢服務，達到促進健康之目的。

結果

健檢參檢人透過健康管理加值服務資訊系統建立個人化健康電子檔案，藉此分析相關健康指標的異常情況，評估個人健康情況，預警可能發生的疾病，進而控制疾病的發生與發展，延長壽命。

結論

本文將健康管理理念注入醫療院所健康管理中心的健檢服務，不僅可以提供參檢人良好的自主健康管理服務，亦提供健康管理中心在管理服務品質革新上的參考，為醫療院所獲得經濟和社會效益的雙贏。

Associations between Body Composition and Pulmonary Function Are Age-Dependent in Middle-Aged and Elderly Subjects

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Introduction

People with aging have been linked to sarcopenia and deterioration of pulmonary functionthat often leads to progressive disability and loss of independence.This study aims to investigate the associations betweenbody composition and pulmonary function, focused on different age groups.

Methods

During May 2015 through August 2015, we enrolled 243 middle-aged and elderly subjects (87 males, 156 female) to participate the slow exercise (Tongtzu gymnastic exercise training) training program, excluding those who with major operation, stroke, acute myocardial infarction, cancer, acute asthmaor chronic obstructive pulmonary disease in recent 3 months. Before exercise training, every participant received body composition, standard pulmonary function testbefore and after exercise, and cardiovascular function studies. Pulmonary functiontest (PFT) was measured by Spirolab III® (Medical International Research; MIR, Roma, Italy) included force vital capacity (FVC), the forced expiratory volume in one second (FEV_1), and peak expiratory flow rate (PEF). Body composition was measured by bioelectrical impedance method (Tanita, Model BC-418, Tokyo, Japan).

Results

Participants were divided into two groups by age; < 65(middle-aged, N=151) and ≥ 65 years old(elderly,N=92); with mean age of 56.91 ± 7.10 and 70.36 ± 4.40 years, respectively. After controlling covariates age, sex, smoking andalcohol habit, albumin levels, FVC and FEV_1were positively associated with fat free mas (FFM), leg FFM, trunk FFM, total predicted muscle mass (PMS), arm PMS, leg PMS and trunk PMS.For every increase of 1 Kg total PMS, pulmonary function increased 36 ml in FVC and 34 ml in FEV_1 in middle-aged group. However, in elderly group, FVC and FEV_1 were positively associated with trunk PMS, for every 1 Kg increaseintrunk PMS, pulmonary function increased 74 ml in FVC and 63 ml in FEV_1. However, FVC was negatively associated withFAT (%) of arm and leg:for every 1 % increaseinarm and leg fat, pulmonary function decreased 18 ml and 28 ml in FVC respectively.

Conclusion

Associations between pulmonary function and body composition are different between middle-agedand elderly groups. Associations between muscle mass and pulmonary function are more significant in middle-aged group than that in elderly group. However, associations between body fat (%) and pulmonary function aremore significant in elderly group than that in middle-aged group.Prevention of muscle wasting is very important to maintain pulmonary function in aging population.

Effects of Sweetness Inspection of Fruit and Food on Diabetes Mellitus

果物甜度檢測對糖尿病患之影響

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Introduction/ Purpose

一般而言，水果的甜度高低與含糖量關係密切，甜度是人的主觀感受，無法以物理或化學方式測量。糖度，雖然俗稱甜度，但與糖的相對甜度值意義不盡相同。以蔗糖為基準的各種糖類通常是與蔗糖比較，進而訂出的甜度是相對而非絕對值。以往曾有糖尿病患吃現切蘋果搭配鳳梨汁，竟導致血糖飆升而緊急送醫，而且果物的甜度與 GI 值不一定成正比。民眾往往攝取過多糖份而影響健康。

Methods

本文以嵌入式系統的開放平台，開發出整合糖尿病患者的居家照護系統，利用光電檢測原理的感測單元來測量果物之含糖量。取用不同果物的榨汁，滴到甜度感測元件模組上，利用光線穿透不同濃度的液體時，折射角度會產生改變的原理來測量其不同濃度的待測物，與其他物質的折射率及光譜的變化，以換算出其實際濃度。

Results

本文中之感測單元是由一光源經由光電元件進入水果的內部，將分析結果比對，甜度高的水果，其糖的成份較多而吸收較多的光，其反射的光就較弱，甜度低的水果，糖份較少吸收的光也較少，其反射光則較強。因此由反射光的強弱與其他物質的折射率及光譜的變化，即可判定果物的甜度。

Discussion/ Conclusion

一般糖尿病患者除重視水果糖份的攝取外，也重視水果本身的品質，尤其是糖度。本研究團隊，期許繼續開發出對果物糖份非破壞性檢測分級技術及無線可攜式簡易設備。將設備應用近紅外線及影像檢測原理，直接檢測果物內部品質、外部形狀篩檢到出料輸送系統及控制系統等。可以在不破壞果物之情況下，以光檢方式來量測水果內部、多視角影像檢測及配合生產品質篩選功能，快速且準確的檢測出果物糖度、酸度、瑕疵率及相關項目等。

The right to health early on: Promoting health literacy and assessing meaningful outcomes

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Introduction/ Purpose

Betel-quid (BQ) chewing is racially-ethnically acculturated, and socio-economically related as well. Lee and associates (2012) found that BQ chewing was 123 times more likely to develop into an oral cancer than non-consumers when the synergistic effect of alcohol, betel-quid and cigarette (ABC) consumption was involved. Another prevailing risk factor is Deng Fever. The accumulative reported cases by city ranged from 40 to 45,957 since 1998, and Kaohsiung, where this present study was taken place has the highest breakout rate over years.

Considering the health needs in context, **this study aims to introduce the health prevention strategies, and to summarize findings of prevention outcomes, and seven PH students' qualitative outcomes in health promotion to make a case of how PH professionality is enhanced through a collective and organized effort in advocating the equity and right to health early on regardless of race, gender and the socio-economic status.**

Methods

A comprehensive research strategy and associated workflow was developed. Two types of health promotion events were studied. First one involved three separate teaching sessions in 5th graders' classes (n=90), and the other was a 12th graders' one-day biology camp (n=210) hosted by the PH students' home institution. Two different questionnaires, and 15 questions each were developed for pre-post tests to gauge how health literacy may have increased after the intervention.

Results

The correct response rate of the survey questionnaire ranged between 20% to 97% before the intervention, and between 78% to 98% afterwards. Similar patterns were found in all sessions. PH students' reflective writing were analyzed and developed into three themes: 1) from fragmental to integrity; 2)from uncertainty/self-doubt to action; and 3) from students to professionals

Discussion/ Conclusion

The identity of public health professionals was established through collective and organized efforts in real communities. Although positive learning outcomes enhanced the motivation of health promotion, it was the interaction with the need/the public strengthened the sense of professionality in public health. Therefore, engagement early on in PH students' curriculum is not only meaningful, but also beneficial to their own sense of professional identity.

解構環境汙染之社會性：以『環境正義』析論之

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Introduction

經濟發展對於自然環境中的土壤、空氣與水帶來許多衝擊，更重整了人、經濟、環境三者的互動關係。『環境正義』起源於美國泛指環境法令或政策之形成、適用與執行時，利害關係人（stakeholder），不論種族、國籍背景、收入或教育程度為何，皆應被公平對待；其利益應該被實際的納入考慮。公平對待指的是任何社會族群不應在欠缺影響決策之管道下，被迫接受不合比率的環境負擔或環境風險。美國於 1991 年第一屆「全國有色人種環境領袖高峰會」(First National People of Color Environmental Leadership Summit)擬定《環境正義基本信條》，呼籲保障人們免於採取、製造和棄置有毒廢棄物與毒品之威脅，以鞏固人們享有乾淨的空氣、土地、水及食物之基本權利。台灣亦在 2002 年制定《環境基本法》，希望透過此法提升環境品質，增進國民健康與福祉。『環境正義』透過政策制定，落實環境保護/自然保育。

Methods

本研究以『環境正義』解構環境保護議題，探討其人-經濟-環境三者的關係，重新檢視環境議題的社會面，尋求新環境議題下的環境正義。

Results

雲林六輕工業區則是經濟利益交換下的產物：從設置前的充分溝通而獲得當地居民的同意，到決定經濟回饋居民的方式而達成共識。然而，工業造成的污染遠大於經濟效益。國立台灣大學的研究團隊歷經五年追蹤研究顯示（2015），自 1990 年六輕建廠至 2010 年間，若排除吸菸、嚼食檳榔與 C 肝的居民，台西與麥寮兩鄉的居民，其全癌症發生率增加了 3.04 倍；空氣品質上，崙背站(31ug/m3)與台西站(24ug/m3)兩區 PM2.5 數值超過全國年平均(22.4ug/m3)，更超過我國所制定的標準值(15ug/m3)。

Discussion/ Conclusion

台塑每年給予當地居民經濟回饋，而政府也協力幫助當地許厝國小學童換校就讀。兩者似乎態度積極。但以『環境正義』解構之即可發現程序不正義、地理性不正義、社會性不正義等三種類型的環境不正義：1) 台塑出資改善國小的空調，以解決校園有空氣惡臭的問題，而非改善空氣污染源; 2) 許厝國小學童尿液中的硫代二乙酸（TDGA）等代謝物濃度偏高，政府則以重新安置學童至較遠的校區就學; 3)缺乏公聽會幫助企業-政府-居民三者的溝通。經濟補償與遷校等作為僅是治標不治本，居民承擔不成比例的健康風險。

原有的『環境正義』著重人類群體的平均分配，但新污染議題衍生出環境保護的多面性與複雜度，皆超出各造間的協調與經濟互惠。例如，居民所承受的健康風險可能造成個人與跨世代之健康危害、農漁業生產降低等，皆無法透過企業補償而解決。因此，『環境正義』在人、經濟、環境三者的平衡，應進入環境-人-經濟為順序的永續、健康與跨世代經營。

Associations between Pulmonary Fibrosis and Functional Change in Brain: The Role of Autophagy

自噬作用在肺纖維化與腦部功能改變關係之角色探討

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Introduction

Previous studies reported that lung inflammation causes alternations in electroencephalography (EEG) and the reduction in EEG complex; however, the possible mechanism underlying functional change in brain in patients with pulmonary fibrosis (PF) remains unclear.

Methods

A bleomycin-induced PF SD-rat model was used to examine the effects of PF on functional change in brain. Autophagy activator (Torin 1), inhibitor (3MA) and PBS vehicle control were used (i.p.) after 14 days of bleomycin treatment. EEGwas monitored pre- and post-instillation of bleomycin and treatment with Torin 1 and 3MA. The sleep quality and multiple scale entropy (MSE) were analyzed based on the brainwave data.

Results

The associations between PF and the functional change in brain was discovered. Firstly, we observed that REM ratio decrease in 3MA group (49% to 46%), whereas the REM ratio increased in Torin group (36% to 44%). Slightly increase of EEG entrophy was observed in the bleomycin-induced rats with 3MA treatment. Reduction of EEG entrophy was observed in the rats with Torin 1 treatment. Together, our results suggest that autophagy may play an important role in regulation of functional change in brainin PF.

Conclusions

The results show the association betweenPF and functional change in brain. Autophagy is essential in regulation of brain dysfunction in PF.

Keywords: autophagy; brain; entrophy;pulmonary fibrosis.

Assessment on the validity of a dish-based semi-quantitative food-frequency questionnaire used in a longitudinal study in rural Bangladesh

孟加拉縱貫性研究飲食習慣問卷信效度評估

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Introduction/Purpose

A locally validated dietary assessment tools was needed to evaluate long-term intake of participants of a prospective epidemiological study in rural Bangladesh. We used a multi-facet statistical approach to assess the validity of a dish-based 42-item semi-quantitative food frequency questionnaire (FFQ) in Bangladesh using two 3-day food diaries (FD) conducted in two different seasons.

Methods

Cross-sectional comparisons of food consumption data from the FFQ and from two 3-day FD were made in a sample of 190 participants randomly selected from 47 families concurrently participated in a longitudinal As biomonitoring study. FD was collected on the female head of household and the FD for other family members was estimated using adult male equivalent (AME) method. Nutrition intake was calculated using FAO Food Composition Table for Bangladesh. Multiple statistical tests were used to compared intakes measured by FFQ with those by FD, including Pearson's product moment correlation, Spearman's sign rank test, paired t-test, percent difference, cross-classification, weighted Kappa coefficient, and Bland-Altman analysis. Seasonal variability was quantified by intra-class correlations (ICC) between dietary intakes of the two seasons.

Results

FFQ has good validity for total energy intake (paired t-test $p<0.05$; percent difference <10%; Bland-Altman correlation $p>0.05$), with no presence of proportional bias. All macronutrient intakes had good correlation ranging from 0.43 to 0.50, but carbohydrate had large percent difference and presence of proportional bias. Some vitamin intakes (thiamin, riboflavin, niacin, and folate) had good validity at both the group and individual levels with no presence of bias. L-ascorbic acid had poor validity. Strong ICCs were found for most nutrients between the two seasons, except for vitamin A.

Conclusions

The FFQ provided good validity and enough statistical power to assess and rank long-term habitual dietary intake for rural Bangladeshi population and can be a useful instrument in studying the disease-dietary habit relationship.

Associations between autophagy and corticosteroid in heart of chronic obstructive pulmonary disease animal model

以動物模型探討慢性阻塞性肺病其在心臟組織中的自噬作用與藥物類固醇之關係

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Introduction

慢性阻塞性肺病(Chronic Obstructive Pulmonary Disease, COPD)是全球主要的慢性疾病之一，其病徵與心肺的發炎反應有關。抽菸被認為是導致COPD的主要致病因素之一，但是其可能的致病機轉與藥物使用之交互作用仍不清楚。類固醇為COPD患者最常使用的臨床藥物，其主要為抑制局部與全身性發炎反應的產生。過去研究中指出自噬作用(Autophagy)與藥物類固醇的調控有關，但其相關性在COPD患者心臟中仍不清楚。

Purpose

本研究目的為探討慢性阻塞性肺病在心臟組織中的自噬作用與藥物類固醇之關係。

Methods and Results

本研究使用連續點菸器產生香菸煙霧，每天8小時，一週5天，為期12周的方式全身暴露於BALB/c小鼠，以建立COPD小鼠動物模式。本研究將COPD小鼠隨機分為四組: (1)不給予類固醇(dexamethasone)藥物、(2)給予類固醇(dexamethasone; 10 mg/kg)藥物、(3)給予autophagy抑制劑3-Methyladenine(3-MA, 24 mg/kg)後給予類固醇(dexamethasone; 10 mg/kg)藥物、(4)給予autophagy活化劑Torin1(20mg/kg)後給予類固醇(dexamethasone; 10 mg/kg)藥物。此外，本研究同時進行未抽菸小鼠作為控制組。犧牲前收集其肺容積，以及犧牲後分析血中氧化壓力、發炎指標、心臟組織Light Chain 3B (LC3B)的表現。本研究成功的建立抽菸COPD小鼠模式，其肺容積與發炎反應接顯著與未抽菸控制小鼠有差異。本研究更加發現當COPD小鼠給予3-MA後，類固醇並無法有效的降低發炎反應的產生。值得注意的是，當給予3-MA抑制autophagy的表現後再給予類固醇，其心臟組織的LC3B II表現更加明顯。

Conclusions

本研究結果指出自噬作用可能在類固醇抗發炎能力在COPD病人之心臟扮演重要的角色。

Keywords:發炎反應、LC3B、氧化壓力

Contact Dermatitis in Nail Technician：A Case Report and Literature Review

美甲從業人員之接觸性皮膚炎：個案報告及文獻回顧

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Background and Introduction

Occupational skin disease was the third leading causes in the reporting system of Taiwan, and it can significantly affect workers' physical health status. Criteria of diagnosing occupational contact dermatitis has been published for years. However, with the rapid expansion of nail technicians industry, the health hazard among this industry will be an emerging challenge. Understanding the skin disorder will be important as the association between contact dermatitis and nail technician was reported in foreign literatures but not in Taiwan yet.

Methods

A case of 22-year-old nail technician was diagnosed with contact dermatitis, and the result of site visiting was presented. We will also review types of contact dermatitis, the association between exposure and disease, and further discuss the diagnosis of occupational contact dermatitis.

Case Presentation

A case of 22-year-old nail technician with contact dermatitis was presented, and we present the symptoms, signs, possible exposures, and the treatment course of this patient. We also presented the result of site visiting in order to elucidate the hazard and risk for this patient.

Discussion and Conclusion

The presentation, possible etiology, diagnosis and treatment for contact dermatitis were reviewed, and epidemiologic evidences were also reviewed to elucidate the extent and health hazards of contact dermatitis among nail technicians. The suggestions and conclusions were as followed: Employees should be able to recognize and prevent hazards associated with contact dermatitis in the industry, and supervisors should supply with adequate personal protective equipment. Prevention, early diagnosis and treatment will be more and more important for occupational physicians.

Flight Safety in Patients with Lung Diseases

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Introduction

Since the first commercial flight started in 1914, the numbers of air travelers are increasing day by day, reaching a whopping number of 2 billion flights per year. Commercial aircrafts are required to maintain cabin pressure equivalent to an altitude of less than 8000 feet (2438 m), which is considered a hypobaric environment comparing to air pressure at sea level. This cabin pressure has been proved to cause mild hypobaric hypoxia among healthy individuals since decades ago. However, the age of travelers nowadays is increasing and the prevalence of respiratory diseases is higher among elder populations. Most of the current guidelines and recommendations are enacted decades ago, which may not reflect current conditions or deal with the emergence of novel challenges in air travel. Therefore, the goal of this study is to review whether air travel nowadays is safe for air travelers, especially for those with preexisting lung diseases.

Literature Review of Hazard

We reviewed literatures about the flight safety in patients with lung diseasesand classified the issues as following, detail contentsof each please refer to our poster.

1. Cabin Pressure:
2. Hypobaric Hypoxia and Its Effect:
3. Hypoxic-Challenge Test:

Discussion

It is important to predict adverse consequences related to hypoxia during a commercial flight as medical resources are not easily accessible as they are on the ground. A study of a ground-based communications center that provides medical consultative service to airlines estimated that medical emergencies occur in 1 of every 604 flights. In-flight adverse medical emergencies often lead to medical diversions, causing extra financial burdens and raising safety concerns due to an enforced landing at an unfamiliar airport.

Previous studies showed the acute effect of hypobaric hypoxia and shortcomings of current guidelines and screening markers. Newer guidelines should be established to adapt current environment. Besides, most of the studies about hypobaric hypoxia mainly focused on its acute effect. Long term effect of hypobaric hypoxia, which was experienced by air crew in their work, is not well known to the best of our knowledge. This may provide directions for future studies.

Arc Flash Hazard Review

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Introduction

Arc flash is the explosion of electric arc, which is the electrical breakdown between two conductors. Arc flash hazard is a big issue in high-voltage workplace, but few articles or researches focus on the topic in Taiwan. The goal of this poster is to review the probable injury caused by arc flash and the means to protect and prevent arc flash hazard.

Case Review

A 62 year-old man of arc flash burn came to our OPD for rest evaluation. He had worked in the power substation as a repairing engineer. An arc flash explosion happened, and the patient was knocked away. Second-to-third degree burn most on the front accounts for 62% of whole body surface and immediate consciousness lost were noted. Left common peroneal nerve injury was associated. No other cardiac, neurologic or psychologic problems.

Literature Review of Hazard

We reviewed literatures about the arc flash hazard and classified the issues as following, detail contents of each please refer to our poster.

1. The cause of arc flash
2. The difference between arc flash and electrical injury
3. Temporary or permanent visual loss
4. Temporary or permanent hearing loss
5. Skin burns
6. Inhalation injury
7. Discussion

The Prevention and Protection of Arc Flash Hazard

There are some prevention and protection methods we can do by engineering controls, administrative controls, and personal protective equipment use. For engineering controls, safer machine and remote control system can be applied. For administrative controls, well-trained workers and available first aid when accident happens are necessary. For personal protective equipment (PPE), the products should be examined how much energy they can bear, and the hazard category of the PPE should be labeled.

Aerodynamics Analysis of Flow Control Applying to Local Ventilation

流動控制應用於局部排氣系統改善之空氣動力學分析

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引言

1987 年，Lisa Woodrow 的研究顯示洩漏與面速度並無顯著相關。從 1998 年 K. Maupins 等人研究也發現，雖然全美實驗室約有 30%-59%排煙櫃通過面速度測試，其中僅有 13%通過 ANSI/AIHA 追蹤氣體測試的恕限值標準。顯然，排煙櫃面速度不是有效且直接的排煙櫃性能評估方法。不僅如此，還可能造成能源的浪費卻達不到維護使用者安全的狀況發生。

目標

建立傳統與新型工作站之數值模型，分析內部流場結構與發生洩漏的相關性。

方法

利用流動控制技術，針對可能發生洩漏的區域進行結構上的修改，預期達到減少洩漏的發生狀況。

結果

一、側板後縮以及導圓的設計，使流體分離與迴流區的產生被限制在新型工作站當中，同時限制了汙染物的逸散；二、側板與檯面交接處留有間隙，讓新型工作站能夠有更多的進氣空間，打破原先形成於側板內側的大迴流區，減少汙染物在此處聚集的可能；三、將吸氣槽由傳統的圓形改為狹長型，使進氣流場更為平順，減少回流與擾流的產生。

結論

一味地提高吸氣速度不僅耗能，甚至會導致更大的迴流區造成更嚴重的洩漏。正確的流動控制，才是根本的解決之道。

Evaluations to Machinery and Equipment Operators' Musculoskeletal Disease

機械設備操作員之肌肉骨骼健康狀態評估

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Introduction/ Purpose

我國勞工發生手臂頸肩疾病及職業性下背痛有逐年增加之趨勢，經過行業別分析後發現，機械設備操作及組裝人員為腕隧道症候群及腰部椎間盤疾患之好發職業族群。故本研究選定機械設備操作及組裝人員作為群聚調查之對象，了解該事業單位之人因性危害子，協助擬定合宜的預防措施與員工健康管理參考。

Methods

本研究為橫斷性研究，以面談方式進行人因危害健康評估問卷調查與由醫師至事業單位理學檢查，並以 KIM 人工物料處理檢核表進行員工作業觀察與攝影。

Results

本研究共有 20 位員工接受調查，分別為模具製作作業員 13 位、熱壓機作業員 4 位、冷熱定型機作業員 4 位。此 20 位員工中，而因為肌肉骨骼不適症狀就醫者占 40%，因肌肉骨骼不適症狀無法勝任工作者為 11%。調查當天，有肌肉骨骼不適症狀者約佔 45%，過去一週有至少 4 天有肌肉骨骼不適症狀者約有 40%。員工自覺最嚴重之肌肉骨骼不適部位中，以下背痛為最多，佔 55%。在工作負荷因子方面，需要處理重物最多(90%)；其次為蹲或跪(85%)，接著是彎腰或身體扭轉(70%)以及長時間站立(60%)。依據 KIM 量表，而該事業單位多數工作項目風險等級多屬於「3」中高負載。

Discussion/ Conclusion

(1)建議透過該事業單位既有之臨廠服務醫護人員給予健康照護及醫療適應性評估，預防職業疾病之發生；(2)員工自覺最嚴重之不適部位為下背部，建議針對常見之下背部疾病如：腰部椎間盤疾患等，給予員工預防職業病之改善方案；(3)建議針對該單位最常見之人因危害（處理重物、蹲或跪、彎腰或身體扭轉、長時間站立及手舉過肩等）作優先改善。

Assessment to Musculoskeletal Disease and Human Engineering in Chinese Restaurant Staffs

中式餐廳勞工之肌肉骨骼健康狀態評估與人因評估

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Introduction/ Purpose

依據職業傷病通報系統通報資料及相關國內外文獻，餐飲業從業人員在工作時有較高之肌肉骨骼疾病發生率；某中餐廳員工有肌肉骨骼不適之問題前往醫院求診，故針對該餐廳內場及外場員工以理學檢查與問卷進行肌肉骨骼疾病調查與分析，評估其職業暴露與肌肉骨骼疾病之相關性，並提出預防改善建議。

Methods

本研究為橫斷性研究，以問卷調查搭配理學檢查的方式針對餐廳外場及內場員工進行肌肉骨骼疾病調查。問卷實施後就蒐集之資料，進行資料統計分析。

Results

參與員工共 12 位：內場人員 7 位，皆為男性，年齡平均為 38.0 歲(95%CI 27.0-49.0)，平均工作年資為 16.4 年(95%CI 4.5-28.3)，過去有肌肉骨骼疾病史者比例為 2 位(28.6%)；外場人員 5 位，皆為女性，年齡平均為 50.8 歲(95%CI 42.4-59.2)，平均工作年資為 17.6 年(95%CI 1.2-34.0)，過去有肌肉骨骼疾病史者有 4 人(80%)。

12 位員工當中，有肌肉骨骼疼痛主訴者高達 9 人(75%)，其中又以肩部疼痛及下背疼痛的比例較高，各為 4 人(25%)；而根據本中心主治醫師臨床診斷，員工中有肌肉骨骼疾病診斷者達 9 人(75%)，其中又以罹患肌筋膜症候群、肩袖症候群、下背痛者比例較高，各為 2 人(16.7%)。7 位內場人員中，被診斷有下背痛之症狀較高，共有 2 人（28.6%），其他診斷包括肌筋膜症候群、肩袖症候群、伸肌肌腱腱鞘炎、肌腱炎、脊椎側彎等；5 位外場人員則被分別診斷有肌筋膜症候群、肩袖症候群、狹窄性肌腱腱鞘炎、伸肌肌腱腱鞘炎等。

然透過針對標號 11 號之個案進行工作影片錄製，並 KIM-MHO 人因工程檢核表評估後，其風險分數為 45.5 分，風險等級為第三等級，且該個案罹患右肩袖症候群、左腕伸肌肌腱腱鞘炎，無法排除與工作內容之相關性。

Discussion/ Conclusion

1.建議透過教育宣導，讓員工正確認知人因風險，並指導員工安全之作業方式，以降低人因危害；2.改善內場員工之工作動線，減少烹煮過程中不必要的人因危害；3.可針對個別員工進行工作動作影片錄製，並依照狀況進行個別化指導。

A Distribution of Work-Related Mental Diseases Cases In Taiwan

我國因工作壓力引發之精神疾病個案之現況

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Introduction/ Purpose

近年來，職場工作壓力引發之精神疾病鑑定、求償與糾紛引起世界各國高度關注，但目前多數國家仍未將工作壓力引發之精神疾病列為工作者補償之職業疾病。惟有別於歐美，亞州國家工時普遍較長，日韓等國紛紛將職業性精神疾病納入職業傷病補償的範圍，台灣亦參考日本，須訂了相關參考指引。

Methods

了解台灣因工作相關心理壓力引起之精神疾病確診之職災勞工分布狀況。本研究屬描述性流行病學研究，歸納並分析 2007-2015 年間經職業醫學專科醫師評估後，確診為因工作相關心理壓力引起之精神疾病個案資料。

Results

據職業傷病通報系統中通報之 50 例因工作相關心理壓力引起之精神疾病確診個案中，19 例為男性(38%)，平均年齡為 41.2 歲；31 例為女性(62%)，平均年齡為 40.7 歲。以年齡別論，40 歲以下計 24 例，40 歲以上有 26 例。以行業別看，製造業 17 例居首(34%)。以疾病別論，罹患情感性疾病有 25 例(50%)；精神官能症 25 例(50%)，分別為創傷後壓力症候群 23 例(46%)、恐慌症 1 例(2%)與環境性適應障礙 1 例(2%)。歷年職業性精神疾病的行業別平均發生率為每千人 0.05%。

Discussion/ Conclusion

因工作壓力引發之精神疾病個案量雖然遜於其他種類之職業病個案，但對於個案、其家庭與社會皆是一大負擔；其中，罹患創傷後壓力症候群者多因職業傷害所造成，如何合理且妥適照顧職災勞工罹災後至復工之適應期，盼能引起更多討論。

A Distribution of Asbestos-Related Disease in Labors in Taiwan

我國勞工罹患石綿暴露相關疾病之現況探討

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Introduction/Purpose

石綿是國際癌症研究機構（International Agency for Research on Cancer)所歸類第一類致癌物質，各國自 1970 年代起漸漸禁用石綿產品，因為其引發癌症之潛伏期長達數十年，日本與英國已經出現石綿暴露群聚之大量發病個案，從使用石綿的高峰期時間來做推估，各國可能將進入石綿相關疾病之發病高峰期。

Methods

本研究係描述性流行病學研究，檢視台灣近九年來石綿暴露個案罹病狀況，歸納分析 2007-2015 年間我國石綿相關疾病個案之相關資料。

Results

據職業傷病通報系統中通報之 54 例石綿暴露相關疾病個案中，51 例為男性(94.4%)，3 例為女性(5.6%)，平均年齡為 63.2 歲。以個案的罹病分類來看，所佔比例最高的是肋膜壁層惡性腫瘤跟肋膜惡性腫瘤(各 25.9%)，次高的則是石綿沉著症(11.1%)。行業別則以營造業所佔比例最高(40.7%)，平均發生率為每千人 0.24%；製造業為次高(31.5%)，平均發生率為每千人 0.05%。職業別則以技術工所佔比例最高(46.3%)。

Discussion/Conclusion

營造業與製造業勞工之石綿相關疾病發生率高於其他行業，佔我國主要通報石綿相關疾病的大宗，然而卻不能排除有低估的情況。石綿引發之癌症早期不易發現，發病時多已接近末期，死亡率極高，建議可由石綿加工相關產業之勞工加強篩檢，以掌握勞工罹病狀況。如何落實預防端的勞工特殊健檢發掘潛在暴露個案，與診治面的早期發現與治療，可能需要更多資源投入預防及診治。

Workplace psychological plus ergonomic risk factors for musculoskeletal discomforts among Taiwanese workers

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Introduction

Work-Related Musculoskeletal Disorders (WRMSDs), the most common type of occupational diseases, are highly associated with not only physiological but psychological factors. However till now, few literatures investigated association of the psychological plus ergonomic factors with WRMSDs in Taiwan. The objective of the study was to have a greater understanding with the contribution of psychological factors plus ergonomic risk factors for musculoskeletal discomforts (MSDs).

Methods

A cross-sectional study was conducted among 23,932 participants in Taiwan. A self-administered questionnaire provided by Ministry of Labor was used to collect data regarding MSDs of several body areas and about demographic, individual, physiological and psychosocial factors. Multivariable logistic regression model and log-binomial model were used to assess the association between each or combined risk factors and MSDs of neck, shoulder, lower back, and wrist. Population attributable risks were then estimated for combined risk factors in the final multivariable model.

Results

Four psychological factors included from nine items selected out of questionnaire. The results of the multivariable analysis indicated that physiological combined with psychological working factors (PAR%: about 50% in male; 20-30% in female) were highly associated with the MSDs, with nearly 10% of MSDs attributed to psychological factors. Gender difference apparently showed in the physiological factors, by two times more in male than in female, whereas association of psychological workplace factors, except for workplace justice, with MSDs is more in female. Still, comparing sleep quality and sleep length, overall results indicated that sleep quality contributed more to MSDs than duration of sleep.

Conclusion

This study found that in addition to ergonomic exposure from work, psychological factors significantly contributed to LBP. Besides ergonomic intervention, strategies to improve psychosocial work environment and sleep conditions are warranted to reduce LBP.

Occupational Exposure of Hyperthermic Intraperitoneal Chemotherapy: A Literature Review

高溫腹腔化療灌洗術之職業暴露：文獻回顧

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Background

Hyperthermic intraperitoneal chemotherapy (HIPEC) can increase survival among patients with peritoneal carcinomatosis. However, the occupational hazardous drugs exposure during HIPEC among healthcare workers is remained unclear.

Aim

Recognize the possible hazards exposure of HIPEC and hazard control strategies.

Methods and Results

In this article, HIPEC literatures are reviewed under the structure of hazards anticipation, exposure assessment and control. Exposure to chemotherapy drugs may induce nausea, vomiting, myelosuppression, neurologic toxicity, renal insufficiency and reproductive hazards. Therefore, chemotherapy drug platinum (Pt) was used as a marker in environmental exposure assessment of HIPEC procedures. The sampling results indicated no that Pt was not detected in urine or air, while the floor and surgeon's gloves are highly contaminated.

Conclusion

During HIPEC procedure, healthcare workers may be exposed to hazardous drugs through surface contamination. Environmental decontamination and personal protective equipment should be thoroughly applied.

Literature review: Work-related neck pain
職場頸部痠痛

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Background and Aim

Non-specific neck pain is a common condition amongst the general population. The total cost of NP in the Netherlands in 1996 was estimated to about 1%(€485 million) of the total health care expenditure or 0.1% of the Dutch gross domestic product, not to mention the global cost. Also, in 2005, spinal problems accounted for 9 % of the total US health care expenditures, which increased 7 % per year for persons with spinal problems. However, there is still lack of enough data and better strategies applied for this issue in workplace. Therefore, this article would review the latest papers and discuss the possible further strategies for workplace neck pain.

Methods

The NIOSH publication No. 97-141 “Chapter 2. Neck Musculoskeletal Disorders: Evidencefor Work-Relatedness’” was taken into discussion. Also, those latest-associated clinical researches are collected through the electronic databases including CDC, CLINICALKEY, and NCBI.

Results

The 1-year prevalence of neck pain ranged from 16.7% to 75.1% for the entire adult population (17–70 years), with a mean of 37.2%, which was estimated in 22 studies. According to NIOSH publication, there is evidence that neck musculoskeletal disorders MSDs was significantly associated with highly repetitive work and forceful exertion. Additionally, there is strong evidence that working groups with high levels of static contraction, prolonged static loads, or extreme working postures involving the neck/shoulder muscles are at increased risk for neck/shoulder MSDs. Besides, among white-collar workers, especially who have low social support, a job strain effect(Psychosocial factor) should also be considered because that it is highly associated with neck-shoulder symptoms. It is also important to distinguish pain that is localized to the neck or shoulder from more generalized pain involving the neck/shoulder region. The latter has higher 1-month prevalence (35.1% vs 5.6%), and tends to be more troublesome that it is significantly stronger associated with somatising tendency and poor mental health. With regard to ergonomic field, patients with non-traumatic neck pain are shown to have a more forward head posture in standing than pain-free participants. For these patients, scapular function training would be a good way to reduce pain intensity and increase shoulder elevation strength. However, physical exercise does not substantially reduce the risk among people with frequent exposure to work stress.

Conclusion

Non-specific neck pain is a growing problem in occupational issues. However, there is still no detail about the definite diagnosis of neck pain. Further studies should be performed and accumulated to have more information in this area.

Benzyl butyl phthalate increase breast cancer stem cell expansion through S1PR3 signaling

鄰苯二甲酸酯經由 S1PR3 訊息路徑提高乳腺癌幹細胞擴展

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Introduction/ Purpose

Understanding the regulatory mechanisms unique to breast cancer stem cells (BCSCs) is required to control breast cancer metastasis.

Results

We found that phthalates promote BCSCs in human breast cancer cell cultures and xenograft tumors. A toxic phthalate, benzyl butyl phthalate (BBP), activated aryl hydrocarbon receptor in breast cancer cells to stimulate sphingosine kinase 1 (SPHK1)/sphingosine 1-phosphate (S1P)/sphingosine-1-phosphate receptor 3 (S1PR3) signaling and enhance formation of metastasis-initiating BCSCs. BBP induced histone modifications in *S1PR3* in side population (SP) cells, but not in non-SP cells. SPHK1 or S1PR3 knockdown in breast cancer cells effectively reduced tumor growth and lung metastasis *in vivo*.

Discussion/ Conclusion

Our findings suggest S1PR3 is a determinant of phthalate-driven breast cancer metastasis and a possible therapeutic target for regulating BCSC populations. Furthermore, the association between breast carcinogenesis and environmental pollutants has important implications for public health.

Cubital Tunnel Syndrome in Excavator Driver: A Case Report and Literature Review

鏟裝機駕駛員的肘隧道症候群：個案報告及文獻回顧

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Background and Introduction

Cubital Tunnel syndrome, also known as tardy ulnar palsy or ulnar entrapment at the elbow, is less commonly known in the reporting system of Taiwan but it can significantly affect workers' physical health status. As there are many workers working in road-works, construction industry who are currently driving the excavator car (鏟裝機), the health hazard among this industry will be an emerging challenge. Understanding the cubital tunnel disorder is important and this report aim to make use of foreign literature reviews to determine the association between cubital tunnel syndrome and excavator car drivers.

Methods

A case of 57-year-old excavator driver was diagnosed with cubital tunnel syndrome, and the result of site visiting was presented. We will also review the association between exposure and disease, and further discuss the diagnosis of occupational cubital tunnel syndrome.

Case Presentation

A case of 57-year-old excavator driver with cubital tunnel syndrome was presented, and we present the symptoms, signs, possible exposures, and the treatment course of this patient. We also presented the result of site visiting in order to elucidate the hazard and risk for this patient.

Discussion and Conclusion

The presentation, possible etiology, diagnosis for cubital tunnel syndrome was reviewed, and epidemiologic evidences were also reviewed to elucidate the extent and health hazards of cubital tunnel syndrome. The suggestions and conclusions were as followed: Employees should be able to recognize and prevent hazards associated with cubital tunnel syndrome in the industry, and supervisors should supply with adequate personal knowledge to prevent the overuse of the elbows. Prevention, early diagnosis and treatment will be more and more important for occupational physicians.

β-N-Methylamino-L-Alanine and Neurodegenerative Diseases: A Systematic Review

β-甲氨基-L-丙氨酸與神經退化性疾病：系統性文獻回顧

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Background

Beta-N-methylamino-L-alanine (BMAA) is a non-proteinogenic amino acid produced by cyanobacteria and can be biomagnified via food chain in multiple ecosystems. Since the investigation of the elevated incidence of amyotrophic lateral sclerosis-parkinsonism-dementia complex (ALS-PDC) found in the Chamorro people in the island of Guam, BMAA has been proposed to be a neurotoxin that can lead to neurodegenerative disease. Multiple *in vivo* and *in vitro* studies have been done, revealing the association between neurodegenerative disease and BMAA exposure. We will review on the current understanding of BMAA and its role on neurodegenerative disease.

Methods

Systematically review the literatures about different aspects of BMAA, including a brief history, the *in vitro* and *in vivo* studies associating BMAA with neurodegenerative disease, the establishing animal model of BMAA-induced ALS-PDC, the mechanism of neurotoxicity, and the source of exposure.

Results

The role of BMAA in the onset as well as progression of neurodegenerative diseases is strongly supported by many studies. BMAA-treated animal models have shown many pathophysiological features of human ALS and therefore been proposed as a good model mimicking human ALS. Other than dietary exposure through cycad plant seed and flying foxes found in the Chamorro people, high level of BMAA was also found in shark fins, bottom-dwelling fish and shellfish. Hypotheses of exposure through inhalation of aerosolized BMAA, drinking water, and breast milk were also proposed. Though much is discovered, researching on the mechanism of BMAA neurotoxicity is still an ongoing process. Moreover, with amino acid L-serine found to have a protective effect on BMAA dietary exposure, clinical trials have been initiated to test its effect on ALS patients.

Conclusion

BMAA is a neurotoxin found in multiple ecosystems and has been proposed to be related to neurodegenerative disease. The mechanism of toxicity and exposure limit are still not fully discovered. Further investigation may shed light on our understanding, and even treatment of neurodegenerative disease.

牡蠣剝肉工作者的腕隧道症候群：個案報告及文獻回顧

Carpal Tunnel Syndrome in Osyter Shuckers: A Case Report and Literature Review

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Background and Introduction

Oyster shuckers are special working population in Taiwan's western and southwestern coast, mainly consisted of middle-aged female workers in fishing villages. Thanks to their hard working, we could enjoy many famous Taiwanese traditional cuisine, like oyster omelets or oyster noodles. However, due to long working hours and highly repetitive forceful hand/wrist motion, there are high prevalence of musculoskeletal disorders among them, which is frequently under-reported due to oyster shucking as informal and atypical working in small fishing villages. Among these musculoskeletal disorders, carpal tunnel syndrome is especially important due to its high prevalence and large amounts of working hour loss. Thus, it is important to understand how occupational carpal tunnel syndrome in oyster shuckers could happen and how could we prevent it by modifying related hazardous ergonomic factors in oyster shucking.

Methods

We review the epidemiological studies of oyster shuckers and clinical studies of carpal tunnel syndrome, and related ergonomic knowledge of carpal tunnel syndrome is used in analysis of the presented case and the provided video of oyster shucking.

Case Presentation

A case of 27-year-old oyster shucker with carpal tunnel syndrome of non-dominant hand is presented with provided video of oyster shucking, and we present the symptoms, signs, possible exposures, and the treatment course of this patient. We also present the analysis of working process of oyster shucking in order to find the related hazardous ergonomic factors.

Discussion and Conclusion

Apart from the traditional concept of strength or repetitiveness, angles of wrist motion is also important ergonomic factors in pathogenesis of carpal tunnel syndrome. The analysis of working process of oyster shucking showed that radial deviation and extension of wrist of non-dominant hand is frequently involved during shucking in order to firmly fix the oyster. These finding corresponds with the clinical studies of keyboard typing and could explain the incidence of carpal tunnel syndrome of non-dominant hand in this case. Furthermore, we also find that the height of working station is closely related to the wrist angle in fixation of the oyster, and raising the height of working station may be useful in prevention of carpal tunnel syndrome in oyster shuckers.

An investigation of plantar fasciitis among nurses in Taiwan

我國護理師足底筋膜炎問卷調查

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背景介紹

我國自 2014 年於台北市有百貨公司專櫃小姐久站而患有足底筋膜炎，經台北市勞工局調查，職業病與否當時受到社會關注。根據 Michael Tuggy 及 Mary Gillam 兩位醫師於 Clinical Key 所整理 17 篇文獻及目前相關疾病指引，足底筋膜炎的定義為：足底筋膜重複性微小損傷導致的膠原退化，其最具特色的症狀為如同刀割足跟疼痛。護理工作也同時具有久站特性，人數亦更為眾多，因此本研究將探討護理工作者足底筋膜炎與各種因子關聯性，做為中心未來預防參考。

研究方法

職業傷病管理服務中心於今年進行了有關足底筋膜炎的調查，除訪視護理站了解實際工作危害因素之外，更以廣泛式問卷調查方式，詢問護理工作者是否有下背或下肢傷病，以及各種危險因子例如工作中是否需要久站、久坐、搬運重物、彎腰、蹲跪、從事該職務的時間、每天需站立的時間等多項因子，也以匿名的方式，調查護理人員其個人危害因子及護理人員對於職業傷病的態度、就醫習慣等做為未來職業傷病防治中心宣傳或合作對象選取的參考資料。分析上使用 SAS9.3 統計軟體，以迴歸分析(Regression model)比較各個因子是否與目前有足底筋膜炎的關聯性。

調查結果

肌肉骨骼疾病的預防訊息態度方面，大多數人都是在疾病發生之後才對訊息進行蒐集佔 83.7%。大部分亦皆有二種以上的就診選擇，以西醫科別佔大宗，最常就診超過半數的科別為西醫骨科(56.8%)、西醫復健科(53.6%)，其次常見者為中醫骨傷科(40.3%)、民俗療法或國術館(31.0%)、休息不做特別處理(29.9%)。危害的心理認知層面，大多數人都有重複多種危害的認知，以不良的工作姿勢為最大宗佔 99.8%。對於這些護理人員的每天工作站立時間，以站立四到八小時的組別為最高接近一半(47.3%)，有些甚至會超過八小時(佔 20.2%)，可能以病房照護病人工作的護理師為主。而護理工作中經現場訪視發現，除了站立時間長之外，還常見到的危害因子包括有彎腰、蹲跪等。經過迴歸模型校正統計後發現，對於足底筋膜炎疾患而言，工作中需搬重、工作中需彎腰、工作中需蹲跪、從事工作年份、走動或站立的時間、鞋子越大等屬於危險因子，久坐則屬於保護因子。

結論與建議

建議在職場上對於上述發現之危害因子進行工程控制、行政控制等安全衛生措施，以降低人因危害。