showed that working conditions substantially changed (i.e. difference of one standard deviation) between two waves. Social support and emotional job demands had the highest amounts of substantial changes (17% and 19%), while physical demands remained relatively stable (6% substantial change). After the first two waves, about 12% of workers with a chronic illness left paid employment. Results of discrete-time survival models are expected to be available in 2019 (by the time of the EPICOH conference).

Conclusion Ensuring that working conditions can be adapted to the needs of older workers who have a chronic disease may help to extend working life.

P.2.31 ASSOCIATION BETWEEN WORK AND CHRONIC OBSTRUCTIVE PULMONARY DISEASE REVIEW OF SYSTEMATIC REVIEWS

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Introduction Chronic Obstructive Pulmonary Disease (COPD) is a highly prevalent disease with reported prevalence up to 12%. Although smoking is one of the main factors in causing COPD, evidence from systematic reviews grows that also occupational exposures contribute. To examine whether work-related risk factors are associated with chronic pulmonary obstructive disease (COPD) a review of systematic reviews was performed.

Methods Medline was searched from 2009 until 20 June 2017 for systematic reviews. Systematic reviews were included when outcome data were described in terms of clinically assessed COPD by means of data on lung function and at least two levels of work-related exposure were mentioned (exposed versus low or non-exposed). One author selected studies and extracted data, two authors assessed study quality with AMSTAR.

Result Eight systematic reviews met the inclusion criteria. In all reviews various exposures to vapour, dusts, gases, and fumes (VGDF) at work are associated with COPD. Most of the included studies are cross-sectional and show a high heterogeneity in population, setting and – mostly self-reported – exposures. Two high-quality reviews including meta-analyses show associations and excess risk of COPD for work-related general exposure to VGDF with a summary odds ratio of 1.4 (95% CI 1.19–1.73) and for work exposure to inorganic dust with a mean difference in predicted FEV1 of –5.7% (95%CI: – 8.62% to – 2.71%).

Discussion Exposure to VGDF at work is associated with a small but increased risk of COPD. More detailed workplace measurements of specific VGDF are warranted to gain an insight into dose-response relationships.

P.2.32 CHANGE IN EMPLOYMENT STATUS IN SURVIVORS WITH OCCUPATIONAL CANCERS

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Background The aim of this study is to investigate the socio-demographic information and employment status for 2 years after diagnosis with occupational cancers.

Method In the Labor Registry Cohort of Taiwan during the period 2004–2015, 86 workers diagnosed with occupational cancers were identified. The cancer group included all kind of cancer diagnosed during this period. The cancer diagnoses were recorded according to the International Classification of Diseases for Oncology. Sex, age, industrial classifications, and occupational status were registered for the year 2004. The person's annual wage and salary income was registered in New Taiwan Dollar (NTD) and divided into tertiles of 16500–22800, 24000–40100, and 42000–43 900.

Results There were 86 eligible workers with occupational cancers in our cohort study. All eligible participants were categorized into 2 groups based on their work status. There were 61 unemployed survivors with mean age of 53.05±8.3 and 25 employed survivors with mean age of 46.2±9.2 (table 1). Employed survivors had younger age and lower salary income than unemployed survivors. At 2 year of follow-up (figure 1), there was substantial declined trend for employment percentage (from 100% to 29%). For change of salary income, increased percentage of salary income change was observed. In different age groups (figure 2), young group aged 28–45 years had significantly higher employment percentages than older groups aged 46–55 years and 56–71 years. Notably, there were elevated percentage of salary income change in older group aged 56–71 years.

Conclusion Our study highlighted that the workers with occupational cancers had apparent dilemmas in the workplace 2 years after diagnosis.

P.2.33 THE ASSOCIATION BETWEEN PATTERN OF SHIFT WORK AND SLEEP QUALITY AMONGST NURSES IN UNIVERSITY HOSPITAL IN NORTHEASTERN REGION OF THAILAND

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Introduction Shift work associated with many health problems, work performance and injury. Disturbance of sleep quality is the main mechanism of shift work effects. Nurses are at risk of many occupational hazards and also shift work. The information about shiftwork and the association of sleep quality amongst nurses of Thailand is still limit.

Objective To study the association of shift work and quality of sleep and which pattern has highest risk of poor quality of sleep amongst nurses in university hospital in Northeastern region of Thailand.

Material and method One thousand and one hundred nurses were met inclusion and exclusion criteria with 75.5%(n=831) participation rate. The data was collected via questionnaire including personal information, shift schedule, depression screening questionnaire, obstructive sleep apnea screening questionnaire and sleep quality questionnaire (PSQI). Cross-sectional analytical study was conducted.

Result All patterns of shift work amongst sample were irregular shift work. There were statistically significant association between shift work and poor quality of sleep. Predominant backward shift pattern has higher association

of poor quality of shiftwork than predominant forward shift pattern.

Conclusion Even shift work associate with poor quality of sleep but good strategy of shift work scheduling help to decrease risk of poor quality of sleep.

P.2.35 HEART RATE VARIABILITY AND SLEEP-RELATED BREATHING DISORDERS IN COMMERCIAL DRIVERS

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Background Sleep-related breathing disorders, such as obstructive sleep apnea (OSA), seems to have an important influence on the autonomic nervous function on the heart, and associated with cardiovascular mortality. Therefore, we assessed the relations of sleep apnea-related parameters with 5 min heart rate variability (HRV) in a large cohort of male commercial drivers.

Methods This cross-sectional study recruited 245 male bus drivers from one transportation company in Taiwan. Each participant was evaluated by a polysomnography (PSG) test and by blood lipids examination. Severity of OSA was categorized according to the apnea-hypopnea index (AHI). In addition, short-term HRV was tested.

Results Subjects were categorized into severe OSA group (n=44; 17.9%), moderate and mild OSA group (n=117; 47.8%), and non-OSA group (n=84; 34.3%). AHI had negative correlations with SDNN ($\beta=-0.075$, $p=0.007$) and RMSSD ($\beta=-0.121$, $p<0.001$), adjusting for age, body mass index, smoking, drinking, systolic blood pressure, HDL, and fasting blood glucose. RMSSD level was decreased with severe OSA ($\beta=-0.266$, $p=0.042$) even adjusting for confounders.

Conclusions The findings showed a low level of RMSSD in OSA among commercial drivers, especially in the severe group category. Decreased SDNN and RMSSD levels are associated with AHI level in commercial drivers, suggesting that they are tightly linked with autonomic dysfunction.

P.2.36 ASSESSMENT OF SERUM AND URINARY BIOMARKERS FOR PNEUMOCONIOSIS IN A COHORT OF STONE WORKERS EXPOSED TO ASBESTOS-CONTAMINATED MINERALS

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Background Pneumoconiosis is still a problem in workers process non-asbestiform asbestos minerals and serpentinite rocks, such as nephrite, antigorite or talc that may contaminate with paragenetic asbestos minerals. An effective screening method is still lacking. The objective of this study was to assess the diagnostic accuracy using the serum and urinary

biomarkers for pneumoconiosis in workers exposed to asbestos-contaminated minerals.

Methods Prediction models of pneumoconiosis were constructed from 140 stone workers (48 cases of pneumoconiosis and 118 controls) exposed to asbestos-contaminated minerals. We measured serum soluble mesothelin-related peptide (SMRP), fibulin-3, carcinoembryonic antigen, and urinary 8-Oxo-2'-deoxyguanosine (8-OHdG)/creatinine levels. Using the ILO international classification of radiographs of pneumoconiosis profusion subcategory $\geq 1/0$ as the reference standard, we established a prediction model by machine learning algorithm. We assessed the accuracy by the area under the receiver operating characteristic curve (AUROC).

Results The SMRP level increased in workers exposed to nephrite. A dose-response relationship was found between the SMRP level and the severity of pneumoconiosis in workers exposed to asbestos-contaminated minerals. Machine learning algorithm composed of sex, age, and 4 serum and urinary biomarkers is able to predict pneumoconiosis with high accuracy (AUROC ranged from 0.76 to 1.00).

Conclusion Our finding highlight the use of serum and urinary biomarkers can be developed as a screening tool for pneumoconiosis in workers exposed to potential asbestos contaminated minerals.

P.2.37 SPANISH FIREFIGHTER'S 10-YEAR FOLLOW-UP STUDY ON CANCER MORTALITY

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Introduction Firefighters are exposed to different occupational risks in their work, some of which are carcinogenic. However, there has no studies on investigating the mortality of this group of workers in Spain. The objective of this study is to compare the mortality rate of all cancer sites in firefighters with the rest of employed workers.

Methods Mortality was calculated from a longitudinal study between 2001–2011. A total of 9.5 million men aged from 20 to 64 years with employment in 2001 were followed. For all cancer sites, the standardized mortality rate (SMR) has been calculated by age per 1 00 000 person per year and the rate ratios (RT) have been estimated for firefighters versus the rest of employed workers with 95% confidence intervals (95% CI).

Results The overall mortality of cancer in firefighters is not statistically different from that observed in the rest of the employed workers (RT=1.00 (95% CI 0.89–1.12)). For most cancer sites, no significant differences were observed in the mortality rates between firefighters versus the rest of employed workers, the exceptions were cancers of the hypopharynx and larynx cancer, which had a higher magnitude in firefighters, whose mortality rate ratios were 2.96 (1.31–6.69) and 1.77 (1.01–3.09), respectively.

Conclusion Exposure to occupational risks factors may be responsible for excess mortality from hypopharyngeal and larynx cancer in firefighters. In the future, more research is needed on the health of firefighters and strengthening preventive policies for these workers.