discriminant analysis, the sensitivity was 88.0%, specificity was 67.9%, accuracy was 80.8%, and ROC-AUC was 0.91 (95% CI: 0.85 to 0.97) in the training set. In the validation set, the sensitivity was 66.7%, specificity was 71.4%, accuracy was 70.0%, and ROC-AUC was 0.86 (95% CI: 0.69 to 1.00).

Discussion Breath test may have potential in screening for pneumoconiosis. A multi-centre study is warranted to establish a reliable model and the procedures must be standardised to prevent confounding factors before clinical application.

79 ASBESTOSIS AND GENE-ENVIRONMENT INTERACTIONS

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Introduction Although the causal relationship between asbestosis and asbestos exposure has been well proved, little is known about the genetic factors that may influence the development of this disease. This study investigated the influence of gene-gene and gene-environment interactions on the risk of developing asbestosis.

Methods The nested case-control study included 262 cases with asbestosis and 265 controls with no asbestos-related disease studied for MnSOD, ECSOD, CAT, GSTT1, GSTM1, GSTP1, and iNOS polymorphisms. Data on cumulative asbestos exposure and smoking were available for all subjects. PCR based methods were used for genotyping. Logistic regression analysis was used to asses asbestosis risk.

Result The OR of asbestosis was 3.21 (95% CI: 2.43 to 4.23) for cumulative asbestos exposure; 0.98 (95% CI: 0.69 to 1.39) for smoking; 1.50 (95% CI: 1.01 to 2.24) for *MnSOD* −9Ala/Ala versus Ala/Val and Val/Val; 1.63 (95% CI: 0.62 to 4.27) for *ECSOD* 213Arg/Gly versus Arg/Arg; 1.36 (95% CI: 0.70 to 2.62) for *CAT* −262TT versus CT and CC; 1.20 (95% CI: 0.85 to 1.69) for *iNOS* LL versus SL and SS; 1.01 (95% CI: 0.71 to 1.43) for *GSTM1*-null; 0.61 (95% CI: 0.40 to 0.94) for *GSTT1*-null; 1.52 (95% CI: 1.08 to 2.15) for *GSTP1* 105Ile/Ile versus 105Ile/Val and 105Val/Val; and 0.97 (95% CI: 0.64 to 1.48) for *GSTP1* 114Ala/Ala versus 114Ala/Val and 114Val/Val. The associations between MnSOD Ala−9Val polymorphism and asbestosis, and between iNOS genotypes and asbestosis ($p=0.038$) were modified by CAT−262C>T polymorphism ($p=0.031$). A strong interaction was found between *GSTM1-null* polymorphism and smoking ($p=0.007$), *iNOS* $(CCTTT)_n$ polymorphism and smoking ($p=0.054$) as well as between *iNOS* $(CCTTT)_n$ polymorphism and cumulative asbestos exposure ($p=0.037$).

Discussion The findings suggest that in addition to asbestos exposure the interactions between different genotypes, genotypes and smoking, and between genotypes and asbestos exposure have an important influence on developing asbestosis and should be considered seriously in future research on occupational/environmental asbestos-related diseases.

802 SPIROMETRY LONGITUDINAL DATA ANALYSIS SOFTWARE (SPIROLA) FOR RESPIRATORY DISEASE PREVENTION AMONG SHIPYARD WELDERS IN SOUTH KOREA

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Introduction Workplace health monitoring using periodic spirometry has been recommended as a tool for prevention of respiratory disease. The Spirometry Longitudinal Data Analysis (SPIROLA) software is an integrated visual and quantitative tool to aid in monitoring lung function in individuals participating in spirometry-based health monitoring programs developed by Centres for Disease Control and Prevention (CDC).

Methods We analysed the annual lung function decline in 385 male workers of the Korean Shipyard Welder Cohorts by SPIROLA. To evaluate the annual decline of spirometry data, we analysed the longitudinal spirometry data collected from 2010 through the year 2015 in workers who had at least four follow-up tests. We estimated each person's rate of FEV_1 and FVC decline and group's rate of FEV_1 and FVC decline.

Result The results on 385 workers with 4 or more years of follow-up showed that the mean rate of FEV_1 decline was higher than that for the Korean population. And decline of lung function in welders suggest a greater effect in smoking status.

Discussion This study indicates the need for respiratory disease prevention and intervention in this shipyard welders. The computerised annual lung function decline program is very useful of workers' respiratory health prevention. So We need to develop a program suitable for workplace environment in Korean.

890 WORK-RELATED ASTHMA AMONGST ASTHMATIC PATIENTS IN THE EASY ASTHMA CLINICS IN KHON KAEN, THAILAND

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Introduction Work-related asthma (WRA) amongst asthmatic patients in worldwide country are about 15%–25%. In Thailand, there are at least 3 million asthmatics patients but there have never been a figure of WRA presented. This is the first study in Thailand where a proportion of WRA amongst asthmatic patients was figured.

Methods A descriptive study was performed. The samples of 523 asthmatic patients in the Easy Asthma Clinics were

interviewed in order obtain information related to onset of asthma and suspected cause of asthma. Four questions related to WRA included:

- history of asthma symptoms which get well when away from work or on holidays
- history of asthma symptoms which get worsen during the working days
- evidence of the sensitising or irritant agents in workplace that have been previously studied causing WRA
- evidence of exposure to the sensitising or irritant agents in workplace that have been previously studied causing WRA.

Descriptive statistics was used for analysis of data.

Results The proportion of WRA amongst asthmatic patients was 16.3%. Of those with WRA, 69.0% were new-onset asthma (87.9% were occupational asthma (OA) and 12.1% were reactive airways dysfunction syndrome). The remaining of 31% was work exacerbated asthma. The top three defined occupations were those working in the manufacturing, ground cleaning/waste management services and personal care and services, respectively. Considering the agents, top three agents were chloramine, metal fume and wood dust, respectively.

Conclusion The current study showed a similar result reported elsewhere where 16.3% of asthmatic patients were WRA and as expected, OA contributed most. This finding encourages physicians to explore patients' occupation and their job descriptions since they will help physicians to focus on WRA. Therefore early recognition of early-onset of WRA will help curing or improving asthma at last.

946 OCCUPATIONAL EXPOSURE IN AGRICULTURAL WORKERS – IMPACT ON ASTHMA AND CHRONIC OBSTRUCTIVE PULMONARY DISEASE DEVELOPMENT

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Aim of the study Determination of the occupational exposure influence on asthma and COPD development among crop and dairy farmers, and evaluation of exposure characteristics by job exposure matrices.

Methods A cross-sectional study was performed, including 87 crop farmers and 83 dairy farmers, exposed to respiratory hazards, compared to a control group of 80 office workers. Standard questionnaire on chronic respiratory symptoms and spirometry testing were applied, while farmers were also assessed by job exposure matrices.

Results and discussion Asthma was registered in 8% of crop and 7.2% of dairy farmers, and was significantly associated with atopy, and positive family history of asthma and COPD, while association with smoking habit and duration of exposure was non-significant. The prevalence of allergic was significantly higher compared to non-allergic asthma in exposed and unexposed workers. Occupational allergic asthma was registered in 2.3% of crop and 1.2% of dairy farmers, while the frequency of work-aggravated asthma was 5.7% and 6.1% respectively. COPD prevalence was non-significantly higher in exposed (6.9% in crop and 8.4% in dairy farmers) compared to office controls (3.8%). COPD was significantly associated with age over 40 years, smoking habit, and duration of exposure in exposed subjects. According to data obtained by job exposure matrices, asthma and COPD in crop farmers were significantly related to high intensity of exposure to dust, gases, fumes and vapours on a regular basis, while among dairy farmers they were significantly related to high intensity of dust exposure on a regular basis, as well as high intensity of exposure to gases, fumes and vapours both on sporadic and regular basis.

Conclusion The study results confirm the impact of occupational exposure to respiratory hazards on respiratory health impairment among farmers, including asthma and COPD, being closely related to its duration, characteristics, and intensity.

969 SMOKING AND PULMONARY ALTERATIONS IN RETIRED BAUXITE MINING WORKERS: A RETROSPECTIVE STUDY

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Introduction Retired bauxite mining workers have been at risk for developing lung diseases due to their long-term exposure to inhalation hazards. Smoking is known to decrease pulmonary function and cause lung disease. Smoking cessation may prevent these changes. This study aimed to evaluate whether smoking is associated with pulmonary changes in retired bauxite mining workers.

Methods A cross-sectional study involving the database information of 140 retired bauxite mining workers from Brazil evaluated at the Worker's Health Reference Centre and Social Security National Institute, from July 2015 until June 2016. The workers were divided in 3 groups: smokers (n=47), non-smokers (n=47), and ex-smokers (n=46). The data included: gender, age, spirometric results (normal; altered results including mild, moderate or severe changes), and presence of pulmonary parenchymal alterations in chest x-rays. It was applied the Chi-Squared test with $p < 0,05$.

Results All workers were male with mean age of 62 years-old. In the smokers group, 83% spirometry tests were altered (53% mild, 19% moderate and 11% with severe changes). In this group, 64% had altered chest x-rays. In the non-smokers group, 19% spirometry tests were altered (13% mild and 6% moderate changes). In this group, 13% had altered chest x-rays. In the ex-smokers group, 35% spirometry tests were altered (11% mild, 9% moderate and 15% severe changes). In this group, 30% had altered x-rays. All results were statistically significant, except for the mild changes in the non and ex-smokers groups.

Discussion These results demonstrated differences between the smokers and non-smokers groups in regard to spirometric and radiographic alterations. The ex-smokers group had improved results compared to the smokers group in regard to altered spirometric and chest x-rays findings. These data may contribute with strategies to enhance smoking cessation programs within the bauxite mining industry in order to prevent pulmonary changes in mining workers.