microstructures of monocytes were observed by TEM and SEM, and titanium was identified by energy dispersion type X-ray spectroscopy (EDX). Adherent monocytes were pre-cultured with Alexa 568 dextran (A-Dex) to visualise endosomes.
Results TNS exposure induced apoptosis of PBMC in the 7 days culture, the dose dependency of which was similar to asbestos, although apoptosis was not induced at the early stage of day 2 unlike asbestos. The apoptosis was inhibited by Q-VD-OPh pan-caspase inhibitor. Isolated CD4$^+$ T cells as well as monocytes showed apoptosis caused by TNS exposure, whereas monocytes showed giant vacuole formation prior to apoptosis. TNS-like compounds in vacuoles were observed by TEM, and SEM images showed rough surface of the inner layer of vacuolar membrane, in which titanium was identified by EDX. Most of vacuoles showed co-localization with fluorescence of A-Dex.
Conclusion These results indicate that TNS have toxic effect to cause caspase-dependent apoptosis of immune cells. In particular, TNS showed characteristic toxicity for monocytes, in which engulfed TNS were thought to enter into the endosomal pathway, leading to vacuole formation followed by apoptosis. Those findings suggest hazardous risk of occupational exposure to TNS.

[1]S Lee*, [2]H Okamoto, [1]S Yamamoto, [1]T Hatayama, [1]H Matsuzaki, [1]N Kumagai-Takei, [1]K Yoshitome, [1]Y Nishimura, [3]T Sato, [4]Y Kirita, [2]Y Fujii, [1]T Otsuki. [1]*Dept. Hygiene, Kawasaki medical school, Kurashiki, Japan*; [2]*Cosmic Garden Co., Ltd., Okayama, Japan*; [3]*Specified Non-profit Organisation MEDICAL TECHNO OKAYAMA, Okayama, Japan*; [4]*Okayama University Organisation for Research Promotion and Collaboration, Okayama, Japan*

Introduction Pollen allergy is major problem in Japan. The custom-homebuilding company, Cosmic Garden Co. Ltd., located in Okayama City, Japan was established in 1997 and uses specific natural ore powder (SNOP) in wall materials a to improve allergic symptoms. In this study, we surveyed biological effects of short term stay in a room surrounded by SNOP cloth.
Methods To investigate the biological effects of SNOP, patients with a pollen allergy were recruited to stay in a room surrounded by cloth containing SNOP (CCSNOP), and their symptoms and various biological parameters were compared with those of individuals staying in a room surrounded by control non-woven cloth (NWC). Each stay lasted 60 min. Before and immediately after the stay, a questionnaire regarding allergic symptoms, as well as POMS (Profile of Mood Status) and blood sampling, was performed. Post-stay minus pre-stay values were calculated and compared between CCSNOP and NWC groups.
Results Results indicated that some symptoms, such as nasal obstruction and lacrimation, improved, and POMS evaluation showed that patients were calmer following a stay in CCSNOP. Relative eosinophils, non-specific Ig E, epidermal growth factor, monocyte chemotactic protein-1, and tumour necrosis factor-α increased following a stay in CCSNOP.
Conclusion This ore powder improved allergic symptoms, and long-term monitoring involving 1 to 2 months may be necessary to fully explore the biological and physical effects of SNOP on allergic patients.

[1]S Lee*, [2]H Hayashi, [1]N Kumagai-Takei, [1]H Matsuzaki, [1]K Yoshitome, [1]Y Nishimura, [3]K Uragami, [4]M Kusaka, [1]S Yamamoto, [1]M Ikeda, [1]T Hatayama, [2]W Fujimoto, [1]T Otsuki. [1]*Dept. Hygiene, Kawasaki medical school, Kurashiki, Japan*; [2]*Dept. Dermatology, Kawasaki medical school, Kurashiki, Japan*; [3]*Hinase Uragami Iin, Bizen, Okayama, Japan*; [4]*Kusaka Hospital, Okayama, Japan*

Introduction Silicosis patients (SIL) suffer from respiratory disorders and dysregulation of autoimmunity. Frequent complications such as rheumatoid arthritis, systemic sclerosis (SSc) and vasculitis are known in SIL. Furthermore, we reported previously that some SIL exhibited better respiratory conditions in association with a worse immunological status. In this study, the clinical roles of anti-CENP-B and Scl-70 autoantibodies in SIL were analysed.
Methods Plasma samples were collected from Healthy Volunteers (HV), SIL, Systemic Sclerosis (SSc). Plasma factors and autoantibodies were determined by ELISA. Statistical analysis were performed by SPSS (IBM).
Results The titer index (Log10) of anti-CENP-B autoantibody in SIL was higher than that of HV and that of SSc was higher than those of HV and SIL. This titer index was positively correlated with an assumed immune status of 1 for HV, 2 for SIL, and 3 for SSc. Moreover, although factor analysis revealed that the titer index of the anti-CENP-B autoantibody formed the same factor with the anti-Scl-70 autoantibody, IgG value and age in SIL cases, another extracted factor indicated that the IgA value and anti-Scl-70 antibody were positively related, but anti-CENP-B showed an opposite pattern in the results of the factor analysis.
Conclusion These findings indicated that the titer index of anti-CENP-B autoantibody may be a biomarker for dysregulation in SIL cases. Future clinical follow-up of SIL may therefore require both respiratory and immunological assessment

Cardiology in Occupational Health

[1,2]Bashkireva Angelika*. [1]*Gerontological Centre of Leningrad Region, St. Petersburg, Russia*; [2]*Research and Innovation Centre «Professional Longevity», St. Petersburg, Russia*

Introduction We know the phenomenon of differential ageing to be the result of unequal environment conditions pressure. It is necessary to assess the difference between calendar and biological age (BA) in order to reveal the effects induced by combined occupational hazards in professional lorry-drivers. We have compared the physical (PWC) and mental work capacity (MWC), BA and ageing rates of lorry-drivers (experimental group) and labourers (control group) in connexion with their chronological age (CA), driving experience, occupational environment, work schedule and social-demographic characteristics.
Methods 150 male lorry-drivers (mean age 41.3±0.9) and 150 male labourers (mean age 44.8±0.9) were examined according to the multiply-regressional model of BA evaluation based on

the estimation of PWC and MWC parameters. Integrated indices such as BA on MWC, BA on PWC, BA on (MWC +PWC), predicted biological age (PBA) and ageing rate (BA-PBA) were calculated.

Results Statistically significant differences between MWC, PWC levels and ageing rates in the studied groups were revealed (p<0.001–0.05). BA indices and ageing rates of lorry-drivers were significantly higher in comparison with control group (p<0.001). The results presented showed that in equal conditions of submaximum physical load in both groups a significant premature decrease in adaptation ability of lorry-drivers' cardiovascular system was observed (p<0.001). Analysis of correlations between length of service and CA of lorry-drivers from one side and MWC, PWC, BA indices and ageing rates from the other showed that most of criteria under study depend on driving experience significantly more than on CA of lorry-drivers (p<0.001–0.05). The 40–49 year-old lorry-drivers with 15–19 years of driving experience were identified as a risk group with the symptoms of premature ageing.

Conclusion The above studies revealed the occupational environment and long driving experience being the risk factors for the accelerated ageing of lorry-drivers, which can result in health problems, occupational and work-related diseases.

| 1661 | NEW EVIDENCE ON CHD RISKS DUE TO PSYCHOSOCIAL STRESS AT WORK AND PHYSICAL ACTIVITY |

[1]Johannes Siegrist*, [2]Alicja Bortkiewicz*. [1]*Faculty of Medicine, University of Düsseldorf, Düsseldorf, Germany*; [2]*Department of Work Physiology and Ergonomics, Nofer Institute of Occupational Medicine, Lodz, Poland*

The topics of the session will cover interdisciplinary research on occupational and environmental agents (mainly stress, occupational physical activity, lifestyle) that may increase the risk of cardiovascular diseases (CVD). Those diseases are still a major health problem in Europe and, therefore, an efficient research on this topic is necessary In the frame of the session it will be also presented results of WHO-ILO review on psychosocial risk factors (especially job insecurity and long working hours) and ischaemic heart disease.

Els Clays[1], Marco M Ferrario[2], Giovanni Veronesi[3], Johannes Siegrist[4]

[1]Department of Public health, Ghent University, Ghent, Belgium

[2]Research Centre in Epidemiology and Preventive Medicine, Department of Medicine and Surgery, University of Insubria at Varese, Varese, Italy

[3]Research Centre in Epidemiology and Preventive Medicine, Department of Medicine and Surgery, University of Insubria, Varese, Italy.

[4]Faculty of Medicine, University of Düsseldorf, Düsseldorf, Germany

| 1661a | THE ROLE OF OCCUPATIONAL PHYSICAL ACTIVITY AND WORK STRESS IN CARDIOVASCULAR DISEASE |

E Clays. *Department of Public health, Ghent University, Ghent, Belgium*

Introduction Growing evidence has shown that occupational physical activity increases the risk for cardiovascular disease and mortality. Performing strenuous physical activities at work remains a daily reality for a significant part of workers in different sectors. There is thus a critical need to develop preventive measures against premature cardiovascular disease risk in workers with high physical demands. It is particularly important to elucidate structural preventive measures at the collective workplace level for primary prevention of cardiovascular disease in this group. The psychosocial work stress environment offers opportunities to counter the harmful effects of physical work demands.

Methods and result An overview will be presented of available studies addressing moderating effects of psychosocial stress measures in the relation between occupational physical activity and cardiovascular disease. A limited number of studies have shown that psychosocial resources – like social support at work and level of job control – may buffer the harmful effect on health from physical work demands. In addition, this presentation will focus on the potential mechanisms by which the psychosocial work environment might play a role in the effects of occupational physical activity on cardiovascular health outcomes.

Discussion Research showing that occupational physical activity does not produce cardiovascular health benefits – like leisure time physical activity does – has rapidly expanded over the past decade. On the contrary, more and more evidence confirms that engaging in high levels of occupational physical activity generates increased risk of cardiovascular disease. One of the current challenges in this research field is to investigate how the psychosocial work environment may play a role in this relation. Empirical evidence on the buffering effect of psychosocial stress measures in the relation between occupational physical activity and cardiovascular outcomes is still quite scarce. More detailed investigations using objective measurements are needed.

| 1661b | EXPLORING THE COMBINED EFFECT OF JOB STRAIN AND OCCUPATIONAL PHYSICAL ACTIVITY ON CARDIOVASCULAR DISEASE INCIDENCE |

[1,2,3]MM Ferrario*, [2]G Veronesi, [2,3]R Borchini, [1]M Roncaioli, [4]G Grassi, [4]G Cesana. [1]*School of Occupational Medicine, University of Insubria at Varese, Varese, Italy*; [2]*Research Centre in Epidemiology and Preventive Medicine, Department of Medicine and Surgery, University of Insubria at Varese, Varese, Italy*; [3]*Occupational Medicine Unit, Varese University Hospital, Varese*; [4]*Department of Medicine, University of Milano-Bicocca, Monza, Italy*

Introduction The aim of the study is to investigate the interplay between job strain (JS) and occupational physical activity (OPA) in determining the risk of major cardiovascular diseases (CVD), in a working male population.

Methods n=1515 participants to three population-based (WHO-MONICA Brianza II and III survey and PAMELA) North Italian cohorts, 25–64 years old, employed and CVD-free at baseline, were available for the analyses. JS was investigated using the Job Content Questionnaire (MONICA-MOPSY short version), and dichotomized as high vs no-high strain. A habitual OPA score was derived from the Baecke Questionnaire (8 items) and categorised in tertiles. Age-adjusted hazard ratios (HRs) and 95% confidence intervals for incidence of CVD (first coronary heart disease or ischaemic stroke, fatal or non-fatal) events were estimated from Cox-proportional hazard