for respiratory diseases. However, few population-based studies have been conducted to assess the alterations of circulating pulmonary proteins due to long-term PM_{2.5} exposure.

Methods We designed a two-stage study. At the first stage, we enrolled 558 coke plant workers with a wide range of PM_{2.5} exposure levels as the exposed group and 210 controls in China. Pulmonary injury was measured by lung function and serum Clara cell protein (CC16), surfactant protein A (SP-A), and surfactant protein D (SP-D). Linear regression models were used to assess the associations between PM_{2.5}, pulmonary injury markers, and lung function. At the second stage, significant initial findings were validated by an independent diesel engine exhaust (DEE) cohort with 50 DEE exposed workers and 50 controls.

Results Serum CC16 decreased in a dose-response manner in association with both external and internal PM_{2.5} exposures in two cohorts. In the first stage, serum CC16 levels decreased with increasing duration of occupational PM_{2.5} exposure history. An IQR (122.0 µg/m³) increase in PM_{2.5} was associated with a 5.76% decrease in serum CC16, whereas an IQR (1.06 µmol/mol creatinine) increase in urinary 1-OHP concentration was associated with a 5.36% decrease in serum CC16 in the COE cohort. In the validation stage, the concentration of serum CC16 in PM_{2.5} exposed group were 22.42% lower than that of the control and an IQR (1.24 µmol/mol creatinine) increase in urinary 1-OHP concentration was associated with a 12.24% decrease in serum CC16 in DEE cohort.

Conclusions Reduction of serum CC16 may be a sensitive marker for pulmonary damage in populations with high PM_{2.5} exposure.

Mini-Symposium 2: OMEGA-NET

03D.1 OMEGA-NET INVENTORY OF OCCUPATIONAL COHORTS

¹Michelle C Turner*, ^{2,3}Vivi Schlünssen, ¹Gemma Castano-Vinyals, ⁴Lode Godderis, ⁵Malcolm Sim, ⁶Ingrid Sivesind Mehlum, ¹Manolis Kogevinas. ¹Barcelona Institute for Global Health (ISGlobal), Barcelona, Spain; ²Aarhus University, Aarhus, Denmark; ³National Research Center for the Working Environment, Copenhagen, Denmark; ⁴University of Leuven, Centre for Environment and Health, Leuven, Belgium; ⁵Monash University, Melbourne, Australia; ⁶National Institute of Occupational Health (STAMI), Oslo, Norway

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Europe currently has some of the most valuable occupational, industrial, and population cohorts worldwide. However, in recent years there has been limited coordination and promotion of European health research on occupation and employment. OMEGA-NET is a COST Action (2017–2021) funded by the EU, currently involving researchers from 29 European countries and an increasing number of near neighbour and international partner countries. The overarching concept is to create a network to advance i) collaboration of existing cohorts, ii) coordination and harmonisation of exposure assessment, and iii) facilitation of an integrated research strategy for occupational health in Europe. As part of this work, OMEGA-NET is currently building an online searchable 'Inventory of Occupational Cohorts'. We will inventory epidemiological, occupational, population, and registry-based cohorts with data on occupational exposures and health effects. The inventory will include cohorts with data that is potentially accessible; that

have collected information on occupation and/or industry or at least one occupational exposure; and have at least one follow-up point with health outcomes. Cohorts will be identified through systematic searches and personal records. An initial search identified more than sixty cohorts including more than 40 million persons with information on occupation. Researchers responsible for the cohorts will be contacted and asked to complete a web-based questionnaire. An online searchable 'Inventory of Occupational Cohorts' database will be developed to make the information publicly accessible and to facilitate researcher and policy-maker access to information from past and ongoing cohort studies. Users will be able to search for specific exposures and outcomes and extract basic information on the methodology of the cohorts. The OMEGA-NET Inventory of Occupational Cohorts will be the most comprehensive inventory of occupational cohorts worldwide and is expected to enhance scientific output from individual studies, and facilitate pooled studies, data sharing, and more efficient use of existing cohorts.

03D.2 45 YEARS OF FOLLOW-UP FOR CANCER FOR JOBS AND OCCUPATIONAL EXPOSURES IN 15 MILLIONS IN FIVE NORDIC COUNTRIES – NOCCA

¹Johnni Hansen*, ²Jan Ivar Martinsen, ²Elisabete Weiderpass, ²Kristina Kjørheim, ³Pär Sparén, ⁴Laufey Tryggvadottir, ⁵Elsebeth Lynge, ⁶Eero Pukkala. ¹Danish Cancer Society Research Center, Copenhagen, Denmark; ²Norwegian Cancer Registry, Oslo, Sweden; ³Karolinska Institute, Stockholm, Sweden; ⁴Icelandic Cancer Registry, Reykjavik, Iceland; ⁵Copenhagen University, Copenhagen, Denmark; ⁶Finnish Cancer Registry, Helsinki, Finland

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Introduction A majority of established human carcinogens have been discovered in the occupational setting. For most cancers, including even frequent cancers like colorectal, prostate and breast, however, only a minor fraction of the overall causes has been identified so far. Therefore, it is obvious than even more carcinogens can be discovered through studies of occupation and cancer. This can be facilitated by the use of big high quality data.

Methods Our study covers 15 million working-aged persons who participated in population censuses between 1960 and 1990 in Denmark, Finland, Iceland, Norway and Sweden. These persons have been followed-up for cancer and divided into 70 cancer categories. Further, country and calendar time specific job exposure matrices (JEM) are developed for 30 documented and potential carcinogens, including e.g. asbestos, formaldehyde, wood dust, quartz and several specific metals and organic solvents.

Results In total 2.8 million incident cancer cases are diagnosed in these people during the follow-up. Even for all cancers combined, there is a wide statistically significant variation among men from a relative risk (RR) of 0.79 in domestic assistants to 1.48 in waiters. The occupations with the highest RR also includes workers producing beverage and tobacco, seamen and chimney sweeps. Among women, the overall RR varied from 0.58 in seafarers to 1.27 in tobacco workers. Low RRs were found for farmers, gardeners and forestry workers in both genders. We have also estimated RRs after exposure to e.g. various metals, solvents, formaldehyde and wood dust. Additional examples from the over 50 papers published so far based on this comprehensive on-going cohort will be presented.

Conclusions The present study shows that the risk of cancer is highly dependent on occupation and specific occupational exposures.

03D.3 MEDICATION AS PROXY OF WORK-RELATED HEALTH PROBLEMS

¹Lode Godderis*, ²Lieve Vandersmissen, ²Martijn Schouteden. ¹KU Leuven/Idewe, Leuven, Belgium; ²IDeWE, Heverlee, Belgium

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Introduction In order to investigate the impact of work on health, we hypothesize that medication consumption registered in medical files of workers could serve as a proxy for work-related health problems. In this study, we describe variations in prevalence of specific medication groups between sectors, adjusting for age and gender. In addition, we investigated whether a change in job/sector can have an impact on medication use.

Method Logistic regression analysis is being performed to investigate the effect of occupational sector on the prevalence of specific medication groups, adjusted for year, age and gender. For this, an occupational surveillance dataset of 6 86 434 workers collected between 2011 and 2017 was used. Additionally, regarding the impact on job changes on medication use, analyses are currently being performed by comparing prevalence of specific medication groups in 2011 with 2017 for those employees who changed job during this time period.

Results and discussion In 2011 30,6% male and 49,8% female workers used medication. These figures rose to 43,1% and 67,3% respectively in 2017. The use of medication increased with age: in 2017 38,2% for workers <25 year, 43,6% for 25–34 year old employees, 48,7% between 35–44 year, 61,6% between 45–54 year and 74,1% for older workers ≥55 year. Big differences were observed between sectors. Medication use was highest in health care (67,1% in 2017), government and education. These differences remained after adjustment for age and gender. 9,8% and 9,1% of the workers were treated for respectively pain and neuropsychological disorders in 2017.

Conclusion Significant differences in workers' medical consumption were observed between sectors. This information is now being used for the implementation of a sector-oriented health surveillance program.

03D.4 INNOVATIVE APPROACHES TO DATA ACQUISITION, STANDARDIZATION, POOLING AND ANALYSES OF OCCUPATIONAL HEALTH INFORMATION

Roel Vermeulen*. *Utrecht University, Utrecht, Netherlands*

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Occupation and employment is a major determinant of health and healthy aging. Despite the temporal increase in time spent in employment and profound changes in working life, there is limited coordinated research on occupation and health.

We recently estimated that in Europe alone there is information available on more than 30 million individuals that could be used to study the association between working life and health. However, lack of standardization, inability to code large numbers of job-entries and inability to share data have

hindered progress. In order to unlock the vault of occupational-health information novel ways of data acquisition, standardization, pooling and analyses have to be developed and implemented. The ability of pooling studies would greatly improve occupational health studies by increasing sample size for robust inference, and would allow risk stratification, identification of new risks, exploration of interactions with work and non-work-related factors and detailed analyses on the shapes of the exposure-response curves.

In recent years we have seen progress in several different methodological aspects. Currently, new tools are available to collect information on work and work exposures. These include amongst others the use of sensors and mobile phone applications. Standardization of occupational information is essential for comparison of results between studies and for pooling of studies. This could be achieved by using common occupational coding schemes, use of automatic coding instruments and common exposure assessment tools. Virtual pooling of data has become possible by using data-shields which instead of bringing the data to the analyses bring the analyses to the data allowing federated analyses.

As part of the OMEGA-NET symposium we will discuss the need for new tools and avenues of how to bring occupational health information together. We will present our inventory of novel tools to aid this process, and will discuss future needs.

03D.5 NATIONAL POLICIES AND SOCIAL INEQUALITIES IN EXIT PATHS FROM WORKING LIFE IN SWEDEN

^{1,2}Kerstin Nilsson, ³Roland Kadefors, ⁴Per-Olof Östergren, ¹Lars Rylander, ^{1,5}Maria Albin*. ¹Division of Occupational and Environmental Medicine, Lund University, Lund, Sweden; ²Department of Work Science, Swedish University of Agricultural Sciences, Alnarp, Sweden; ³Department of Sociology and Work Science, University of Gothenburg, Gothenburg, Sweden; ⁴Division of Social Medicine and Global Health, Lund University, Lund, Sweden; ⁵Unit of Occupational Medicine, Institute of Environmental Medicine, Karolinska Institutet, Stockholm, Sweden

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We investigated the impact on work life exits from reduced access to disability pension (2006), and financial incentives to extend working life.

Method and material We used labour statistics, social insurance, and income data, for all employees in Sweden, to compare occupational groups (SSYK, based on ISCO-88), and blue and white collar workers, with regard to i) lost years in working life due to death, disability pension and long-term sick-leave preceding disability pension 2007–2010, ii) granted disability pensions 2007–2011, and iii) premature age pension in 2004 and 2011.

Results Years lost in working life were similar for men and women in the same 1-digit SSYK occupational group, somewhat higher for those born outside Sweden, but showed a clear gradient from white to blue collar occupations, e.g. on average 0.39 ys versus 2.40 ys lost for Legislators/senior officials/managers and in Elementary occupations, respectively (women born in Sweden).

In 2006 the prevalence of disability pension in the age group 50–64 was 3.61% among women and 2.49% among men, with 10/10 of the highest prevalence occupations (4-digit SSYK code) in men, and 9/10 in women, being blue collar ones. Approved applications decreased 2006–2011 by 74.4% in women, and 64.3% in men; for mental disorders (ICD-10-