level perspective in the analysis. All costs and benefits were discounted to the beginning of the exposure reduction period. Various sensitivity analyses were undertaken with key parameters.

Findings suggest the net benefit is positive from 2055 onward for both reduction approaches, i.e., there is a positive return on investment at the societal level. The largest component of benefits is from health-related quality of life gains, with productivity/output gains accounting for the second largest component. Healthcare savings is the smallest component, primarily because cancer cases incur relatively modest health costs due to their short life-expectancy following diagnosis.

Promoting the use of personal protective equipment and engineering controls across the construction sector can substantially reduce exposures to silica dust and give rise to net benefits at the societal level in terms of improvements in health-related quality of life, increased productivity/output, and reduce healthcare costs.

03C.3 LONGITUDINAL ASSESSMENT OF SMOKING CESSATION AND MORTALITY FROM ALL-CAUSE AND ALL-CANCER AMONG SILICOTICS IN HONG KONG, 1981–2014

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10.1136/OEM-2019-EPI.69

Background Occupational epidemiological studies among silicotics showed that long-term smoking cessation had lowered lung cancer risk by over 50%, but the beneficial effect for reducing risks of other diseases remains unknown. We aimed to evaluate the impact of smoking cessation on the mortality from all-cause and all-cancer using a large historical cohort of 3185 Chinese silicotics since 1981 and followed-up till 2014.

Methods Each silicotic's baseline information was collected including socio-demographics, occupational history and medical history. Smoking habits were assessed at the baseline and reassessed during the follow-up. Multiple Cox proportional hazards model was performed to evaluate the impact of smoking cessation on all-cause and all-cancer mortality using adjusted hazard ratio (AHR) and 95% confidence interval (95% CI).

Results By the end of 2014, a total of 1942 deaths occurred and 360 silicotics died from cancer. Compared with never smokers, silicotics who were new quitters had 30% and 65% higher risk of all-cause of death [AHR=1.30, 95% CI: 1.06–1.58] and all-cancer (AHR=1.65, 95% CI: 1.04–2.62), while persistent quitters had a 52% and 49% excess risk of all-cause of death (AHR=1.52, 95% CI: 1.25–1.84) and all-cancer (AHR=1.49, 95% CI: 0.94–2.36), respectively. AHR for all-cause mortality among never quitters was 1.40 (95% CI: 1.14–1.73) while the HR for all-cancer was 2.08 (95% CI: 1.30–3.32). Both all-cause mortality and all-cause mortality decreased sharply after 5 years of smoking cessation and their risks almost equaled to those of the never smokers if the quitters could have kept abstained for more than 20 years.

Conclusions Smoking cessation sharply decreased all-cause and all-cancer mortality among workers with silicosis, and the beneficial effect was prominent for the long-term quitters.

Acknowledgement Pneumoconiosis Compensation Fund Board, Hong Kong

03C.4 INCREASES THE RISK OF SARCOIDOSIS BY SILICA EXPOSURE? A CASE-CONTROL STUDY

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10.1136/OEM-2019-EPI.70

Introduction Sarcoidosis is an inflammatory disease with unknown etiology that involves the formation of granulomas, mainly in the lungs and/or intrathoracic lymph nodes. Hypothesis about the etiology of sarcoidosis are combination of genetic and environmental factors. Previous studies have linked exposure to silica dust with increased risk of sarcoidosis.

Object A case-control study to investigate the silica exposure among Swedish sarcoidosis cases.

Methods The data was collected from the National non-primary outpatient care register kept by the Swedish National Board of Health and Welfare. All cases between the age of 20 and 65 with the diagnosis Sarkoidosis-D86 according to the International Classification of Diseases, 10th Edition (ICD-10) was included in the study (11 772 cases). The information was matched towards the register for cause of death and the register for emigration.

For each case two controls were included matched for age, sex, was resident in the same county, should not be first degree relatives to cases and not have been diagnosed with the investigated disease using the Swedish Central Bureau of Statistics (SCB) multigeneration register. Cases and controls was matched against SCBs occupational registry for work profession. The levels of silica dust exposure were estimated using NOCCA-JEM (Nordic Occupational Cancer study job-exposure matrix) a modified version of the Finnish Information System on Occupational Exposure job-exposure matrix (FINJEM) which is a well-established method of estimating exposure.

Result Cases of sarcoidosis have an increased exposure to silica before diagnosis (1.19; 95% CI 1.1 to 1.30).

Conclusion The increased exposure to silica among sarcoidosis cases suggest that silica can be an environmental factor that contribute to development of sarcoidosis.

03C.5 REDUCED SERUM CLARA CELL PROTEIN (CC16) AS AN EARLY PULMONARY INJURY MARKER FOR FINE PARTICULATE MATTER EXPOSURE IN OCCUPATIONAL POPULATION

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10.1136/OEM-2019-EPI.71

Background Particulate matter is the key component of air pollutants, mainly produced by emissions of coal-fired plants and road traffic. Exposure to fine particulate matter (PM_{2.5}) pollution is associated with increased morbidity and mortality

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

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10.1136/OEM-2019-EPI.72

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

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10.1136/OEM-2019-EPI.73

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.