

**Objectives** This study was conducted to compare the cancer incidence in inorganic lead exposed workers with the Korean general population, and to explore the relationship between cancer mortality and blood lead levels.

**Method** Using from the Korean annual medical surveillance for exposure to lead, a cohort comprising 74 659 inorganic lead exposed workers working between January 1<sup>st</sup>, 2000 and December 31<sup>st</sup>, 2004 was compiled. This cohort was merged with the Korea National Central Cancer Registry (KNCCR) and death registry of the Korea National Statistical Office (KNSO) in order to evaluate the cancer morbidity for these workers between 2000 and 2008.

**Results** There were 793 cases cancer and, the incidence of stomach cancer (SIR 1.17, 95% CI=1.01–1.36) was found to be elevated in lead chromate workers. Excesses were observed for kidney (2.15. 1.19–3.88) and bladder cancers (2.29. 1.149–4.58) in lead exposed workers  $\geq 20$  years of job duration., kidney cancer (2.25. 1.21–4.18) in workers with  $\geq 10$  ug/dl of blood lead level and lung cancer in female workers with  $\geq 10$  ug/dl. Workers with  $\geq 40$  ug/dl of blood lead levels had a significantly higher risk of overall cancer mortality (RR: 2.75; 95% CI: 1.06–1.98) compared with workers who had less than 10 ug/dl.

**Conclusions** Our study showed incidence excess of lung cancer in female workers, stomach cancer in lead chromate exposed workers and a possible dose-response relationship between d kidney cancers and lead exposure. Also overall cancer mortality excess was observed in high lead exposed workers.

#### 0362 RENAL DISEASE INCIDENCE AMONG 58 000 MALE WORKERS WITH BLOOD LEAD MEASUREMENTS

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**Objectives** To determine whether adult lead exposure is associated with incidence of end-stage renal disease (ESRD) in a cohort with measured blood leads.

**Method** We studied 58 000 US male adults from 11 states with blood lead levels measured between 1980–2005. Most were exposed occupationally. One-third had a single blood lead test; the remainder had a median of three. Subjects were divided into five groups by highest blood lead (0–5, 6–24, 25–39, 40–51 ug/dl; 16%, 33%, 34%, and 17% respectively.

**Results** Median follow-up was 12 years; there were 302 ESRD cases. Among those with race information (31%), the ESRD standardised incidence ratio (SIR) (US referent) was 1.08 (0.89–1.31) overall. The SIR in the highest BL category was 1.47 (0.98–2.11), increasing to 1.56 (1.02–2.29) for those followed 5+ years. For the entire cohort (race imputed), the overall SIR was 0.92 (0.82–1.03), increasing to 1.36 (0.99–1.73) in the highest BL category (1.43 (1.01– 1.85) with 5+ years follow-up). RRs in internal analyses via Cox regression (entire cohort, 5+ years follow-up) across BL categories were 1.0 (categories 1 and 2 combined), 0.92, 1.08, and 1.96 (test for trend  $p = 0.003$ ). The effect of lead was strongest in non-whites.

**Conclusions** Data were limited by lack of detailed work history and reliance on a few blood lead tests per person to estimate exposure. Data suggest current US occupational limits on blood lead levels may need to be strengthened to avoid renal disease.

#### 0364 CANCER INCIDENCE AND MORTALITY IN AN AUSTRALIAN COHORT OF LEAD WORKERS WITH HISTORICALLY COLLECTED BLOOD LEAD DATA

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**Objectives** To measure cancer incidence and mortality in a retrospective cohort of Australian lead-exposed workers.

**Method** The cohort comprised male lead workers who had been participants in state government occupational blood lead surveillance programs conducted since the 1970s. Historically collected blood lead level data were accessed from surveillance records. Linkage was undertaken to the National Death Index and the Australian Cancer Database to identify causes of death and incident cancers.

**Results** 4114 male subjects were followed for an average of 16.2 years, giving 68 172 person years. All incident cancers were lower than expected (SIR 83, 95% CI: 73–95). The incidence of liver cancer was elevated (SIR 217, 95% CI 103–454), as was the incidence of oesophageal cancer (SIR 240, 95% CI: 129–447). Among those cohort members with at least one blood lead result in excess of 30 $\mu$ g/dL, oesophageal cancer incidence was elevated (SIR 755; 95% CI 314–1813). Other cancer types were not found to occur in excess. All cause mortality was greater than expected (SMR 111; 95% CI 101–123) based on 406 deaths. Non-malignant digestive system deaths (SMR 167; 95% CI 110–250) and deaths from external causes (SMR 135; 95% CI 105–174) were also elevated.

**Conclusions** The increase in gastrointestinal tract cancers is consistent with some previous studies of lead workers. Confounding from lifestyle factors, such as alcohol, could not be examined. It is planned to include this cohort in an international pooling study of lead exposed workers.

#### 0365 CHALLENGES TO OCCUPATIONAL CANCER EPIDEMIOLOGY IN QATAR

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**Objectives** Assess exposures to occupational carcinogens in Qatar

**Method** IARC conducted a review of environmental carcinogens (IARC Group 1 and 2A) in Qatar 2013. Information was ascertained from ministries and a survey among Qatar Petroleum associated companies

**Results** Major parts of the population are migrant workers; male migrant workers are primarily recruited for the construction and the oil-and gas industry, while female migrant workers mostly do domestic work. The predominant material for construction is lime stone with increasing use of gabbro containing low silica levels compared to quartz. Only small quantities of asbestos have been used. The technologies used for natural gas extraction in Qatar are mostly closed processes.

**Conclusions** Workers in construction and in the oil and gas sector are mainly migrant workers who remain in the country for short