(adjusted Odds Ratio 1.33, 95% CI 1.15–1.55) compared to permanent day workers. ORs increased with cumulative years of rotating shift work and the OR for more than 30 years work 1.54 (1.22–1.94). Having ever worked in permanent night shift was not associated with colorectal cancer risk. Analysis on gene-environment interactions with genes in circadian, melatonin and sleep pathways are ongoing and will be presented.
Conclusions In this large population based study we found an increase in colorectal cancer risk associated with rotating shift work.

0059 LONGITUDINAL MEASUREMENT OF WORK STRESSORS IN PREGNANCY

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Objectives Pregnancy represents a dynamic period when both work conditions and worker assessment of occupational psychosocial stressors may change. We undertook longitudinal repeated measurements of job control, efforts, reward, and overcommitment in pregnant working women to assess direction and magnitude of change across pregnancy.
Method The Job Content and Effort-Reward Imbalance (ERI) Questionnaires were given to 61 working pregnant women recruited at 8–12 weeks gestation and repeated 3 more times across the pregnancy. Demographic data, self-rated (SR) health and stress measures, and blood pressure (BP) data were also collected at each visit. Results were analysed using multilevel linear regression models and generalised estimating equations.
Results 56 subjects (91%) completed at least two waves; 42 (69%) completed all four. Progressive declines in job efforts, rewards, and overcommitment were noted across pregnancy; ERI remained stable. Job Control increased. Black subjects showed evidence of lower job control but also lower effort-reward imbalance across pregnancy, contrasted with Whites/Hispanics. Overcommitment showed the strongest negative association with indices of maternal health, including BP, and SR stress and health. The strongest associations of job constructs with maternal health were noted at mid-second trimester (20–24 weeks) with a decline thereafter.
Conclusions Correlations between occupational psychosocial stressors and intermediate pregnancy-related outcome variables are greatest in early-to-mid-pregnancy. Declining effort and increased control across pregnancy suggest that, in this group, work conditions may be improved, either by the employer or worker, as pregnancy progresses. The possibility of a critical period when associations between work stressors and pregnancy outcomes is also suggested by these results.

0060 PARTICLE SIZE DISTRIBUTION IN ALUMINIUM MANUFACTURING FACILITIES

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Objectives As part of exposure assessment for an ongoing epidemiologic study of heart disease and fine particle exposures in aluminium manufacturing, area particle samples were collected in smelters and fabrication facilities to assess instrument reliability and particle size distribution at different process areas.
Method Personal Modular Impactors (PMI) and Minimicro-orifice uniform deposition impactors (MiniMOUDI) were used to collect samples. The coefficient of variation (CV) of collocated samples of the same type was used to evaluate the reproducibility of the impactors. $PM_{2.5}$ measured by PMI was compared to $PM_{2.5}$ calculated from MiniMOUDI data to assess the validity of using PMI to measure fine particles in personal sampling. Mass median aerodynamic diameter (MMAD) was calculated to characterise particle size distribution at different locations.
Results 62 MiniMOUDI and 71 PMI samples were collected at 44 production areas. Most of CVs were less than 30%. The slope of the liner regression of PMI_$PM_{2.5}$ versus MiniMOUDI_$PM_{2.5}$ was 1.12 mg/m^3 per mg/m^3 (± 0.05), with correlation coefficient of 0.97 (± 0.01). MMADs in fabrications were significantly smaller and less variable than those in smelters ($p = 0.001$). The fraction of PM_{10} which was $PM_{1.0}$ or $PM_{0.56}$ was significantly higher in fabrications than in smelters ($p < 0.001$).
Conclusions The reproducibility for impactors was moderate to high. $PM_{2.5}$ measured by PMI can be a valid measure for fine particle exposure in personal sampling. The concentrations of submicron and quasi-ultrafine particles were similar in fabrications and smelters. $PM_{2.5}$ is not a good surrogate for ultrafine particles in this setting.

0063 INCIDENCE OF KNEE PAIN AND ITS WORK-RELATED RISK FACTORS IN A LARGE WORKING POPULATION

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Objectives This study aims to estimate the incidence of knee pain and its risk factors in a general French working population, representative of the work force.
Method Of 3710 workers of a French region included in a study in 2002–2005 with a self-administered questionnaire, 2332 completed a follow-up questionnaire in 2007–2011. The questionnaires included musculoskeletal symptoms, individual and occupational exposures, and physical limitations (at follow-up only). Incident knee pain in 2007–2011 (i.e. subjects not suffering of knee pain at baseline and suffering of knee pain at follow-up) was dichotomized into sub-chronic knee pain (1–29 days) and chronic knee pain (>30 days). Associations between the incident knee pains and individual and work-related risk factors at baseline were studied separately by gender, using multinomial logistic regressions.
Results Of the 1616 respondents without knee pain at baseline, 122 (7.5%) reported chronic knee pain and 243 (15.0%) reported sub-chronic knee pain; 43% of workers with incident chronic knee pain and 30% of workers with incident sub-chronic knee pain had other chronic pains at baseline, and respectively 51% and 28% reported limitations in climbing stairs. After adjustment for age and BMI, significant associations were found between incident knee pain and handling loads >4 kg (Odds-Ratio (OR) 2.1 (1.2–3.6) among men, OR 2.3 (1.1–5.0) among

women) and kneeling for more than 2 h per day among men (OR 1.8 (1.0–3.0)).
Conclusions This study, conducted in a large representative working population, highlights the relation between incident knee pain and occupational risk factors such as handling loads and kneeling.

0066 PROBLEMS OF VISION, HEARING AND BALANCE AND RISKS OF WORKPLACE INJURY

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Objectives To assess the role of sensory impairments and disorders of balance in occupational injury.
Method The Clinical Practice Research Datalink records all medical consultations, referrals and diagnoses in primary care for 6% of the British population. Using this register we identified 1348 working-aged patients who had consulted medical services over a 20-year period for workplace injury (cases) and 6652 matched controls. Risks were assessed in relation to visual impairment, common eye diseases, hearing loss, perforated ear drum, non-acute otitis media, and disorders of balance, using conditional logistic regression.
Results In all, 173 subjects had had an eye problem before the date of injury consultation (index date), 793 an ear problem (including 336 with impaired hearing and 482 with non-acute otitis media), and 266 a disorder of balance. No associations were found with specific eye diseases or perforation of the ear drum, but odds ratios (ORs) were moderately elevated for eye and ear problems more generally, and higher still in relation to blindness or partial sight (OR 1.90) and non-acute otitis media (OR 2.03). The OR for consulting with disorder of balance within the 12 months immediately preceding injury consultation was 1.81 (95% CI 1.03–3.17).
Conclusions Problems of vision, impairments of hearing, and disorders of balance may all carry a moderately increased risk of occupational injury.

0068 OCCUPATIONAL EXPOSURE TO HAND-TRANSMITTED VIBRATION AND RISK OF DUPUYTREN'S CONTRACTURE

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Objectives To assess the relation between Dupuytren's contracture and occupational exposure to hand-transmitted vibration (HTV).
Method We mailed a questionnaire to 21 201 subjects of working age, chosen randomly from the age-sex registers of 34 general practices in Great Britain and to 993 subjects randomly selected from military pay records. We asked about occupational exposure to 39 sources of HTV and about fixed flexion contracture of the little or ring finger. Analysis focused on men at work in the previous week, for whom estimates were made of average daily vibration dose ($A(8)$ r.m.s.). Associations with Dupuytren's contracture were estimated by Poisson regression, both for lifetime exposure to HTV and for exposures >$A(8)$ of 2.8 ms^{-2} r.m.s.in the past week, with adjustment for age, smoking status, social class and manual activities.
Results Full information on the study variables was available for 4969 eligible men, including 72 men with a history of Dupuytren's contracture, 2287 with occupational exposure to HTV, and 409 with $A(8)$ >2.8 ms^{-2} in the past week. RRs from occupational exposure were elevated 1.5-fold, and were higher still for $A(8)$ >2.8 ms^{-2} (adjusted RR 2.85, (95% CI 1.3–5.97).
Conclusions Our findings suggest that risk of Dupuytren's contracture is importantly elevated in men with high levels of weekly exposure to HTV.

0072 LOWER-EXTREMITY MUSCULOSKELETAL DISCOMFORT AND FATIGUE IN AUTOMOTIVE ASSEMBLY WORKERS

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Objectives To characterise the prevalence of musculoskeletal discomfort and fatigue of the lower extremities (LE) in a large sample of workers in a large, unionised automotive assembly facility. To assess whether floor matting reduced reported prevalence of LE discomfort.
Method Questionnaires were administered to 1353 workers representing 39% of the plant's workforce. Discomfort of the LE was assessed on a qualitative scale. Participants rated tiredness overall and in the legs at the end of their shifts. Information on job designation, use of matting, history of LE or back injury, and use of over the counter pain medication was collected.
Results Highest mean discomfort was reported in the feet (3.04, SD = 1.04) and lowest in the hips (1.50, SD = 1.30). Assembly line or inspection/repair had the highest adjusted mean for discomfort for each body area. Gender- and age-adjusted fatigue ratings overall and in the legs differed significantly based on job designation ($p < 0.0001$). The percent of workers reporting matting, fall-related injuries and use of over the counter medication differed significantly by job designation ($p < 0.0001$, $p < 0.0001$, and $p = 0.0447$, respectively). Among inspection/repair employees, there was no significant difference in mean discomfort and fatigue ratings between those who used matting and those who did not.
Conclusions There is a high prevalence of self-reported musculoskeletal discomfort and fatigue among automotive assembly workers. The difference in reported discomfort and fatigue levels by job designation warrants investigation into factors such as time spent standing and posture during work. Matting did not appear to reduce prevalence of LE discomfort.

0076 LONG-TERM NIGHTSHIFT WORK AND BREAST CANCER RISK IN HONG KONG WOMEN: RESULTS UPDATE

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