Luxembourg, [5] Institute of Occupational Medicine (IOM), Edinburgh, EH14 4AP, UK, [6] Centre for Environment and Health, Department of Public Health and Primary Care, KU Leuven (University of Leuven), Kapucijnenvoer 35, 3000 Leuven, Belgium, [7] Institute and Outpatient Clinic of Occupational, Social and Environmental Medicine, Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany, [8] Department of Public Health, University of Naples Federico II, Naples, Italy, [9] Nofer Institute of Occupational Medicine, Lodz, Poland, [10] Health & Safety Executive, Buxton, SK17 9JN, United Kingdom, [11] National Institute of Health Dr. Ricardo Jorge, Department of Human Genetics and Environmental Health, Lisbon, Portugal, [12] Service de Santé au Travail Multisectoriel (STM), Luxembourg, [13] Radboud Institute for Health Sciences, Radboudumc, Nijmegen, The Netherlands, [14] Public Health England, London, UK, [15] Centre for Environment and Health, Department of Public Health and Primary Care, KU Leuven (University of Leuven), Kapucijnenvoer 35, 3000 Leuven, Belgium, [16] NOVA National School of Public Health, Public Health Research Centre, Universidade NOVA de Lisboa, 1600–560 Lisbon, Portugal, [17] IDEWE, External service for prevention and protection at work, Heverlee, Belgium, [18] Comprehensive Health Research Center (CHRC), 1169–056 Lisbon, Portugal

Introduction: Hexavalent chromium (Cr(VI)) is an important occupational carcinogen. In addition to air monitoring, biomonitoring is commonly applied to monitor exposure to Cr(VI). Within the EU human biomonitoring initiative, HBM4EU, we explored the applicability of different biomonitoring methods in the assessment of occupational exposure to Cr(VI) in welding and surface treatment activities.
Materials and Methods: A multi-center cross-sectional study was performed in Belgium, Finland, France, Italy, Poland, Portugal, the Netherlands, Luxembourg and United Kingdom. Harmonized procedures were used to collect biological and industrial hygiene samples. Contextual information was collected using questionnaires. Altogether 602 exposed workers and controls were included in the study. Exposure biomarkers studied included Cr in urine, red blood cells (RBC), plasma (P) and Cr(III)/Cr(VI) in exhaled breath condensate (EBC). In addition, a number of effect biomarkers were studied.
Results: Among chrome plating workers exposures were the highest. Cr in urine was highly correlated with air Cr(VI) in bath platers and welders. Observed low correlations between different exposure biomarkers suggest that these approaches are not interchangeable but rather complementary.
Conclusions: Cr in urine showed its value as the first approach for the assessment of internal exposure to Cr(VI). We recommend pre- and post-shift samples for low exposure levels. RBC/P-Cr and EBC-Cr(VI)/Cr(III) provide additional information when more specific information on exposure is needed. The current exposure levels require analytical methods with high sensitivity

Sp35-2

Biomonitoring of metal oxide nanoparticles in stainless steel welders

Veruscka Leso [1], Beatrice Bocca [2], Beatrice Battistini [2], Stefano Caimi [2], Marta Senofonte [2], Domenico Maria Cavallo [2], Andrea Cattaneo [3], Piero Lovreglio [4], Mauro Fedele [1] and Ivo Iavicoli [1]

[1] University of Naples "Federico II", Department of Public Health, Section of Occupational Medicine, Naples, Italy, [2] Istituto Superiore di Sanità, Department of Environment and Health, Rome, Italy, [3] Insubria University, Department of Science and High Technology, Como, Italy, [4] University of Bari, Interdisciplinary Department of Medicine, Bari, Italy

Introduction: Welding can cause worker exposure to metal oxide nanoparticles (MO-NPs), including Cr2O3, Mn3O4 and NiO NPs. Our aim was to assess MO-NP exposure in welders through biological monitoring.
Materials and Methods: Welders (n. 18), from 2 Italian welding companies, provided exhaled breath condensate (EBC) and urine samples at the beginning and at the end of the shift on the 1st and 5th day of the workweek, and plasma samples at this latter timepoint. Unexposed controls (n. 15) provided only one sample for each biological matrix. Single Particle Mass Spectrometry (SP-ICP-MS) technique was used to assess MO-NPs exposure in terms of particle concentration (p/mL) and size (nm).
Results: In welder EBC, Cr2O3 NPs showed a significantly higher median concentration at the post-shift of the 5th day of the week (64645 p/mL; 55.1 nm) compared to the pre-shift of the 1st day (15836 p/mL; 57.7 nm). The median Cr2O3 NP plasma concentration and size were significantly lower than in EBC (7762 p/mL; 44.3 nm), while no Cr2O3 NPs were determined in urine. Welders from one of the two companies showed NiO NPs in EBC of the 5th day (median 22000 p/mL; 64.8 nm) and plasma (8248 p/mL; 37.4 nm), although not in EBC of the 1st day and in urine. Cr2O3 and NiO NPs were not determined in controls. Mn3O4 NPs were not detected in any samples of welders and controls.
Conclusions: Although promising, the usefulness of EBC biomarkers of MO-NP exposure needs confirmation on a greater number of workers, under different quantitative and qualitative exposure conditions in order to inform risk assessment and management in welding operations

Sp35-3

Diffuse brain deposition of beta-amyloid among italian ferroalloy workers

Roberto Lucchini [1], Somaiyeh Azmoun [2], Cheuk Tang [3], Donatella Placidi [4], Giuseppa Cagna [5], Manuale Oppini [4], Carlo Rodella [6], Lorella Mascaro [6], Barbara Paghera [5], Megan Horton [3], Roberto Gasparotti [4] and Raffaele Giubbini [4]

[1] Florida International University, Department of Environmental Health Sciences, Miami, USA, [2] Florida International University, Miami, FL, USA, [3] Icahn School of Medicine at Mount Sinai, New Yok, NY, USA, [4] University of Brescia, ASST Spedali Civili- Brescia, Italy, [5] University of Brescia, Italy, [6] ASST Spedali Civili- Brescia, Italy

Introduction: Occupational manganese (Mn) exposure is associated with cognitive impairment and memory dysfunction. A potential neurotoxic mechanism leading to cognitive dysfunction is increased formation of ß-amyloid, a marker of cognitive decline and dementia.
Materials and Methods: We examined differences in cognitive functioning and ß-amyloid brain deposition in 6 ferroalloy workers (average age 64 and average Mn exposure duration 31 years) and 5 historical sex- and age-matched control workers (average age 63), not exposed to metals. Cognitive function was assessed with a battery of neuropsychological tests including the Montreal Cognitive Assessment (MOCA). Mn exposure was based on the 25-years annual assessment of workplace air monitoring