Adverse cardio-respiratory effects of arc welding in a shipyard setting: the WELSHIP study.

Andrea Marongiu,1,2 Omar Hasan,3 Anila Ali,3 Sharoon Bakhsh,3 Bobby George,3 Nabeel Irfan,3 Cristina Canova,1,2 Susie Schofield,1 and Paul Cullinan,1,2

1Dept of Occupational and Environmental Medicine, National Heart & Lung Institute, Imperial College London 2MRC-PHE Centre for Environment & Health, St Mary’s Campus, Imperial College, and 3Medical Department, DryDocks World Dubai, Dubai.

BACKGROUND

- electric arc-welding is a metalworking process that encompasses a variety of techniques aimed at coalescing metals at high temperatures.1
- a by-product of welding is the metal fume aerosol2 of small particles, primarily of ultrafine diameter (<0.1µm), of largely metal oxides and gases.3
- the health of welders is a matter of global concern. Worldwide (based on European estimates4) there are over 10m full-time welders who increasingly are employed in emerging economies.
- previous studies of lung function decline in welders have, on the whole, been inconclusive.5
- studies of the acute cardiovascular effects of welding fume exposure have failed to elucidate the significance of intermediate pre-clinical outcomes in the induction of ischemic heart disease.6

HYPOTHESES

- Oxidative stress from welding fume results in 
  - persistent airway damage & narrowing 
  - chronic changes in vascular function

AIM

- to study the effects of welding fume exposure on the health of the lungs and heart by means of four linked studies:
- Systematic literature review
- Retrospective study (Study 2)
- Cross-sectional survey
- Panel study (Study 4)

SYSTEMATIC LITERATURE REVIEW & META-ANALYSIS (STUDY 1)

- effects of welding fume exposure on airway obstruction and cardiovascular disease
- meta analysis of the cross-sectional pulmonary and panel cardiovascular studies

FIELDWORK SETTING (STUDY 2, 3 & 4)

- Drydocks World Dubai is the largest tanker repair yard in the world
- 3 dry-docks (one ½ km long)
- ~10,000 employees (~4000 welders) in 49 departments
- global workforce
- on-site medical facilities

PUBLIC HEALTH IMPLICATIONS

- application for research funding to conduct larger, longitudinal study in the same shipyard
- evaluation of the feasibility of metabolic/exposomic profiling

ACKNOWLEDGEMENTS

All DryDocks World Dubai employees who are participating in the research; my colleagues in the DryDocks medical team. My studentship is funded by the MRC-PHE Centre for Environment and Health

REFERENCES