Aim of special session A presentation of hazards and health problems in mining and the possibilities for prevention with improved Occupational Safety and Health in small- and large-scale mining worldwide.

Presenters: ¹Erik Jørs, ²Muchtaruddin Mansyur, ³Liem J Fuk, ⁴Stephane Hallé, ⁵Cas J Badenhorst, ⁶Helmut Ehnes

¹Department of Occupational and Environmental Medicine, Odense University Hospital, Odense, Denmark.

²Universitas Indonesia – Faculty of Medicine, Department of Community Medicine, Jakarta, Indonesia

³Prodia Occupational Health Institute International, Jakarta, Indonesia

⁴Ecole de technologie supérieure, Montreal, Canada

⁵Anglo American plc., Johannesburg, South Africa

⁶International Section of the ISSA Mining on Prevention in the Mining Industry, Bochum, Germany

1636a INTRODUCTION TO MINING HAZARDS AND GOOD PRACTICES IN FORMAL AND INFORMAL MINING

E Jørs. Department of Occupational and Environmental Medicine, Odense University Hospital, Odense, Denmark

10.1136/oemed-2018-ICOHabstracts.696

Mining is among the most hazardous workplaces at a global level. Accidents as well as pneumoconiosis, poisonings and cancers take a high dead toll among miners. Other diseases due to heavy workload, noise, vibrations and high or low temperature such as hearing loss, white fingers, carpal tunnel syndrome and muscle and back pain are not deadly but still serious for the miners. In this session we will be presented for miner's liver and kidney diseases, which might have a connexion to the high temperatures, dehydration and salt depletion in mines as also described in some farmers studies from Central America. Implementation of OHS preventive measures in mining is often difficult due to the mostly unregulated small scale and artisanal mining taking place in mainly low-income countries where rules and regulations are hard to enforce. Some key issues in prevention is appropriate laws and their enforcement, banning of toxic mining processes, better environmental control and education and new technology such as cooling vests used for prevention of heat distress among others.

1636b MINING WORKERS, ADMINISTRATIVE TASK, OBESITY, HYPERTRIGLYCERIDEMIA, AND YOUNG WORKERS INCREASED RISK LIVER FUNCTION ELEVATION AMONG INDONESIAN MALE WORKERS

¹M Mansyur*, ²JF Liem. ¹Universitas Indonesia – Faculty of Medicine, Department of Community Medicine, Jakarta, Indonesia; ²Prodia Occupational Health Institute International, Jakarta, Indonesia

10.1136/oemed-2018-ICOHabstracts.697

Introduction Mining workers have potential risks to be exposed by many toxicants. Due to the majority of toxicants metabolised through the liver this may be high risk of the liver function alteration due to occupational and non-occupational health hazards exposures. The purpose of this study was to explore the risk of mining worker to have liver function elevation (LFE) adjusted by other risk factors.

Methods A comparative cross sectional study was conducted to examine the secondary data of 2016 annual medical

examination results of 5634 workers from six various industries in Indonesia. The data subjects consisted of 447 of those who had a LFE compared with 1341 subjects were randomly chosen from those data whose were normal in liver function enzyme. Liver function elevations were considered on the basis of serum aspartate aminotransferase and/or alanine aminotransferase level more than 5 points above reference levels. The risk of mining workers to have liver function elevation were calculated using Odds Ratios and adjusted by Type of Task, Chemical Exposure History, Age, Body Mass Index, Medical History and Triglyceride Level.

Result This study analysed 1781 male workers (31.0 ± 7.4 year). No significant associations were observed between outcome and medical history of diabetes mellitus and liver disease as well as alcohol consumption, smoking, physical exercise, and chemical exposure history. Risk factors associated with LFE were identified including obesity (OR 4.0, 95% CI: 3.1 to 5.0), work in mining sector (OR 2.0, 95% CI: 1.6 to 2.6), role as administrative worker (OR 1.4, 95% CI: 1.0 to 1.8), age <35 years (OR 1.4, 95% CI: 1.1 to 1.9), and hypertriglyceridemia (OR 1.6, 95% CI: 1.3 to 2.1) respectively.

Discussion Attributed risk factors of LFE among worker were identified including occupational, individual and modifiable metabolic risk. Further research is needed to explain the role of occupational exposures in LFE among miners.

1636c MINING WORKERS, OBESITY, KIDNEY DISEASE HISTORY, AND HYPERTENSION INCREASED RISK IMPAIRED KIDNEY FUNCTION AMONG INDONESIAN WORKERS

¹JF Liem*, ²M Mansyur. ¹Prodia Occupational Health Institute International, Jakarta, Indonesia; ²Universitas Indonesia – Faculty of Medicine, Department of Community Medicine, Jakarta, Indonesia

10.1136/oemed-2018-ICOHabstracts.698

Introduction Kidney Disease is a major health problem among productive age group. The purpose of this study was to explore the risk of mining worker to have Impaired Kidney Function.

Methods A comparative cross sectional study was conducted to examine the secondary data of 2016 annual medical examination results of 5634 workers from six various industries in Indonesia. The data subjects consisted of 90 of them who were considered Impaired Kidney Function (IKF) compared with 450 data subjects were randomly chosen from those who were normal serum creatinine. Those who have serum creatinine (SCr) level >1.2 mg/dL and >0.9 mg/dL for male and female respectively were categorised as IKF. Logistic regression analysis was used and the risk of mining workers to have IKF were calculated using Odds Ratios and adjusted by individual risk factors (age, hypertension, obesity, history of diabetes, history of kidney disease) as well as with occupational risk factors (type of task, chemical exposure, and heat exposure).

Result This study analysed 540 workers (32.4 years+8.5). No significant associations were observed between outcome and medical history of diabetes mellitus, alcohol consumption, smoking, physical exercise, as well as chemical exposure history. Risk factors associated with IKF were identified including work in mining sector (OR 6.4, 95% CI: 4.0 to 10.3), obesity (OR 2.5, 95% CI: 1.5 to 4.0), grade II hypertension (OR 3.8, 95% CI: 1.1 to 13.2), history of kidney disease (OR 9.7,

95% CI: 1.5 to 60.9) respectively having been adjusted by age group and working activity.

Discussion Miners appear to be more susceptible of developing IKF rather than other manufacturing workers. Further research is needed to explain the role of specific occupational exposures in kidney impairment among miners.

1636d USABILITY TESTING FOR ERGONOMIC CRITERIA MATRIX: CASE STUDY OF A DEEP MINING COOLING VEST

V Ngô, S Nadeau, S Hallé*. *Ecole de technologie supérieure, Montreal, Canada*

10.1136/oemed-2018-ICOHabstracts.699

Introduction Deep mining and ultra-deep mining (UDM) push the boundaries of what is considered tolerable for workers in hot and humid environments. Since ventilation is costly for mining companies, a novel personal protective equipment (PPE), a cooling vest, is a possible means to safeguard the health and safety of miners. Such a PPE must meet both their needs and expectations. The objective of this study was to build a matrix of ergonomic criteria that would help define the base on which a cooling vest would be developed for deep and UDM.

Methods First, a literature review was conducted on the constraints and requirements that miners are subjected to in deep mining conditions. Then, a field study was conducted in a mine in Abitibi Témiscamingue, Canada. A convenience sample of 20 participants was used to collect information such as height, weight, PPE worn as well as concerns as to the use of a cooling vest. The information collected was then interpreted to generate the matrix of ergonomic criteria suitable for an UDM environment.

Results All participants agreed that a cooling vest would help alleviate the risk of a heat stroke, as well as improve their well-being during work. The main concerns of miners relate to the weight, the comfort and ease of movement. Additional criteria such as design aesthetics, maintenance and conformity to laws, regulations and standard have been added to the matrix. The resulting matrix contains 16 criteria, seven of which are centred on the user and nine on the design of the cooling vest.

Discussion We are hopeful the matrix can be validated and that it will be possible to broaden its use to apply it, for instance, in the development of cooling vests for other hot and humid work environments such as foundries and certain construction projects.

1636e GOOD PRACTICE GUIDANCE ON OCCUPATIONAL HEALTH RISK ASSESSMENT

CJ Badenhorst. *Anglo American plc., Johannesburg, South Africa*

10.1136/oemed-2018-ICOHabstracts.700

In 2009 the International Council on Mining and Metals (ICMM) developed the *Good Practice Guidance on Occupational Health Risk Assessment* to help site practitioners assess and address the risks posed by health hazards in the mining and metals sector. It provided those practitioners with the information they needed to assess the health and well-being of employees and contractors. In 2016 a review was undertaken

to bring the text and advice up to date with changes in the field of occupational health risk assessment and align this document with the terminology and approaches proposed in ICMC documentation published since the first edition, principally the concept of material unwanted events (MUEs) and the management of those through the use of critical controls. The guide identifies the occupational health impacts of mining and metals processing, outlines good practices in the identification of hazards and exposed workers, assists practitioners in estimating exposure levels and assessing the effectiveness of controls and explains the importance of quality analysis and reporting. Healthy workers are essential to the success of mining and metals companies, and ICMC company members are driven in their protection of the health and well-being of both workers and local communities by the ICMC's Sustainable Development Principle 5: 'Pursue continual improvement in health and Safety performance with the ultimate goal of zero harm'. Occupational health risk assessment is the foundation of any occupational health programme and will determine the effectiveness of the programme. It is the intention of the ICMC that this publication provides a practical tool to assist companies in protecting the health and well-being of their workforce.

1636f VISION ZERO – THE GLOBAL FUTURE TO PREVENT ACCIDENTS AND DISEASES IN MINING

H Ehnes. *International Section of the ISSA Mining on Prevention in the Mining Industry, Bochum, Germany*

10.1136/oemed-2018-ICOHabstracts.701

The Singapore World Congress on Safety & Health at Work 2017 truly marked a milestone in prevention. The International Social Security Association (ISSA) launched the Global VISION ZERO Prevention Strategy. As a leading organisation representing more than 320 members in over 150 countries, the ISSA enters a new level of commitment towards 'zero harm' and presents a toolset called the 'Seven Golden Rules' which delivers hands-on solutions for businesses. The approach gives systematic answers to companies worldwide on how to improve safety and health at work while offering a harmonised, proven toolset for managers.

The Golden Rules span the areas

Golden Rule 1: Take leadership – demonstrate commitment

Golden Rule 2: Identify hazards – control risks

Golden Rule 3: Define targets – develop programmes

Golden Rule 4: Ensure a safe and healthy system – be well-organised

Golden Rule 5: Ensure safety and health in machines, equipment and workplaces

Golden Rule 6: Improve qualifications – develop competence

Golden Rule 7: Invest in people – motivate by participation

The presentation will discuss the development of the 'Seven Golden Rules' by ISSA's Prevention Section for the Mining Industry and gives insight into the implementation in Germany, where the German social accident insurance institution for the raw materials and chemical industry – BG RCI introduced it for 35 000 companies.

It will explain the VISION ZERO mindset and experience both internationally and in Germany, and demonstrate what aims, measures and tools have been derived. Furthermore options for cooperation will be discussed.