

very late after injury. In this presentation studies on late health outcome will be briefly reviewed and a recently published study on long term outcome in rugby union players will be presented. In this study, outcome in relation to exposure to repeated head injury was investigated in retired Scottish international rugby players and controls in relation to general and mental health, life stress, persisting complaints, cognitive function, disability and markers of chronic life stress (allostatic load).

Although the estimated number of concussions was high in the retired rugby players (median=7; IQR 5–40), and subtle group differences were detected on two of the cognitive tests (verbal learning and fine co-ordination of the dominant hand), group differences in mental health, social or work functioning were not found late after injury, and there were not associations between the number of concussions and cognitive function.

There is a need for prospective group comparison studies on representative cohorts.

Invited

Occupational Medicine (SCOM/Modernet)

0500 **INVITED KEYNOTE: WHO WOULD HAVE THOUGHT IT? THE UNFORESEEN PROBLEMS OF DISRUPTIVE TECHNOLOGIES**

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Increasing exploitation of Britain's coal resources and the manufacture of steel in the 18th century led to the invention of the steam engine, liberating factories from dependence on water power and enabling transport by railway and steam ships. The application of these technologies and the ideas of Adam Smith on the use of capital led to the Industrial Revolution and Britain's dominance in world trade through the 18th and 19th centuries. However, in large part this was based on gross exploitation of human and other resources throughout Britain and its Empire.

The most obvious health consequences of coal affected miners; accidental deaths and lung disease. The latter became a matter of intense medical dispute right through to the late 20th century. Less obvious at first were the health consequences of air pollution, which made an impact on medical thinking only in the mid-20th century. Even less obvious were more subtle consequences of coal exploitation. The production of coke for making steel was found to cause lung cancer in coke oven workers. Secondary use of the volatile derivatives from coke and coal gas manufacture led to the organic chemical, rubber and plastics industries, from which mankind has derived enormous benefits but which in turn have led to health hazards among workers, from bladder cancers to leukaemias and neurological diseases.

Most serious of all have been the ecological consequences of the use of coal and its successor, oil, to which similar effects on workers can be ascribed. Of these, the most important is climate change which threatens the end of civilisation. This was not foreseen until the very late 20th century. Now we are facing similar threats from other disruptive and primarily beneficial technologies – the world-wide web, robotics,

artificial intelligence, genetic engineering and nanotechnology. Can we foresee these problems and act to reduce the risks?

Invited

Musculoskeletal

0501 **LIFETIME ACHIEVEMENT AWARD – INVITED KEYNOTE: WHY HAVE WE FAILED TO PREVENT BACK PAIN IN WORKING POPULATIONS?**

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Low back pain (LBP) is a major cause of disability globally, and has been linked consistently with occupational activities that load the spine mechanically. However, randomised controlled trials of ergonomic interventions have failed to produce expected reductions in the disorder. Moreover, social security statistics from Britain reveal an eightfold rise in incapacity for work attributed to LBP during 1950–95 at a time when the physical demands of work were reducing.

To shed further light on this apparent paradox, a study (CUPID) was set up to assess differences in the prevalence of musculoskeletal pain and associated disability among workers carrying out similar occupational tasks in different cultural environments, and to explore explanations for any variation. Data were collected by questionnaire from 47 occupational groups (nurses, office workers and others) in 18 countries, with a follow-up survey after a mean interval of 14 months in 45 of the groups.

Analysis of baseline data indicated major variation in the prevalence of disabling LBP, with somewhat higher rates in nurses than office workers, but much larger differences between similar occupations in different countries. The variation was not explained by established risk factors, but correlated strongly with differences in the prevalence of disabling wrist/hand pain. Moreover, baseline extent of regional pain at anatomical sites outside the low back strongly predicted the prevalence of disabling LBP and associated sickness absence at follow-up, explaining much of the variation between occupational groups. These observations, which accord with findings from successive European Working Conditions Surveys, suggest that large international differences in the prevalence of LBP do not depend on causes specific to the spine, but are driven by factors that increase propensity to musculoskeletal pain more generally. Furthermore, a study of migrants from South Asia to the UK indicates that such propensity is environmentally determined, and can increase soon after moving to a new country where rates of pain are higher.

Based on current evidence, it can be hypothesised that while mechanical loading may cause minor strains that trigger episodes of LBP, the severity and persistence of symptoms is driven more by culturally-determined psychosocial factors that affect musculoskeletal pain more generally. If so, while ergonomics has an important role in enabling people to work more comfortably and to remain productive when limited by back pain, the key to reducing the continuing high burden of LBP may lie in understanding what drives differences in general propensity to musculoskeletal pain.