

however, the role of low dose radiation exposure in the aetiology of lymphoma is still uncertain. We investigated the role of occupational exposure to internal and external ionising radiation in the aetiology of lymphoma and its major subtypes.

Methods Between 1998 and 2004, 2348 cases and 2465 controls from six different European countries participated in the multicentre EpiLymph case-control study. A detailed occupational history was collected by questionnaire in all participants a coded using the ISCO68 occupational and NACE industrial coding systems. Based on the same coding systems, we developed a Job Exposure Matrix (JEM) to assess probability and intensity of exposure to internal and external ionising radiation. We used unconditional logistic regression to calculate Odds Ratios and their 95% Confidence Intervals for lymphoma and its major subtypes associated with the ionising radiation exposure metrics, adjusting by age, gender, education and country.

Results Risk of lymphoma overall did not show an association with exposure to radiation either internal or external. Risk of Diffuse Large B-Cell Lymphoma (DLBCL) was elevated and did show an upward trend with intensity of exposure to external radiation (Low Intensity OR=2.1, 95%CI=0.97–4.46 and High Intensity OR=2.5, 95%CI=1.21–5.08). We did not observe any risk increase associated with internal exposure to ionising radiation.

Conclusions Our results provide limited support to the relation between external sources of ionising radiation and risk of DLBCL. We cannot exclude the possibility of bias due to the multiple comparisons we made.

Poster Presentation Cancer

0485 ENVIRONMENTAL EXPOSURE TO RADIOFREQUENCY AND RISK OF LYMPHOMA SUBTYPES

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Introduction Conflicting results have been published on the association between occupational and environmental exposure to radiofrequency (RF) and cancer risk. Information bias might have played a role in some instances.

Methods We geocoded fixed radio-tv transmitters and mobile phone base stations, as well as the residence of 451 cases and 603 controls who participated in a case-control study on the aetiology of lymphoma in Sardinia, Italy. A detailed residential history was available for all cases and controls, including the perceived distance from fixed radio-tv transmitters and mobile phone base stations. We applied the models used by the Regional Agency for Environmental Protection, and conducted RF measurements to estimate the RF field at the door of study subjects. We used unconditional logistic regression to calculate Odds Ratios and their 95% confidence intervals for lymphoma and its major subtypes associated with the RF exposure metrics, adjusting by age, gender, and education.

Results Based on questionnaire data, risk of lymphoma overall was elevated for a cumulative exposure to fixed radio-tv transmitters above the median (OR=2.7, 95% CI=1.5–4.6). Risk was likewise elevated for all lymphoma subtypes. With reference to mobile phone base stations, we only observed a non significant excess risk of diffuse large B-cell lymphoma (DLBCL, OR=2.5, 95% CI=0.7–8.3). Such associations disappeared when we considered exposure based on the models, or the measurements. By comparing the reported distance to the geocoded data, we found out that the cases tended to underestimate the distance from the source of RF emission.

Conclusions Our results do not support the hypothesis of a link between environmental exposure to RF and risk of lymphoma subtypes.

Conflict of Interest statement: None of the coauthors declare any conflict of interest related to the matters discussed in this paper.

Invited

Policy/Impact

0489 INVITED KEYNOTE: DOES EPIDEMIOLOGY COUNT?

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Epidemiology is largely a practical discipline whose findings are used to inform health policy and clinical practice. Occupational epidemiology should address important and tractable questions, generating new information with the potential to influence decisions, even where policy makers encounter strong competing opinions and interests. Priorities for research should include:

1. Exposures in the workplace which may contribute importantly to the burden of illness at population level, but where uncertainty remains about causation or levels of risk (e.g. shift work and breast cancer, chronic kidney disease in sugar cane workers in Central America and parts of Asia).

2. Exposures which although not widespread, could carry a high attributable risk in individual workers. A past example would be haemangiosarcoma of the liver in VCM workers, a contemporary example hypersensitivity pneumonitis in those exposed to metal working fluids (MWF), probably attributable to Mycobacterial infection of MWF.

3. Studies to evaluate the effectiveness of interventions. Such research, while difficult and expensive, can provide critical evidence about both causation and the process of prevention. The challenge is to apply limited resources most efficiently through optimal choice of study questions and methods (randomised controlled trials are not always the best approach).

4. Descriptive epidemiology, both to identify possible unrecognised hazards (including from new technologies), and to check that known hazards are being adequately controlled.

At the same time, it is important to recognise where further research is not needed. In developing countries, studies on affordable methods of reducing hazardous exposures may be more useful than investigations to confirm risks that are already well known.

Oral Presentation

Intervention Studies

0490 A RANDOMISED CONTROL CROSSOVER TRIAL OF A THEORY BASED INTERVENTION TO IMPROVE SUN-SAFE AND HEALTHY BEHAVIOURS IN CONSTRUCTION WORKERS: STUDY PROTOCOL

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Exposure to sunlight can have both positive and negative health impacts. Excessive exposure to ultra-violet (UV) radiation from the sun can cause skin cancer, however, insufficient exposure to sunlight has a detrimental effect on the production of Vitamin D. In the construction industry there are already proactive behaviours for safety onsite, but sun-safety and health remains a low priority. There is limited research in understanding the barriers to adopting sun-safe behaviours and the association this may have with Vitamin D production. This paper reports the study protocol for a text messaging (SMS) and supportive smartphone app intervention, which aims to reduced UV exposure and promote appropriate dietary changes to boost Vitamin D intake. Approximately 60 adult construction workers will be recruited across Scotland and southern England. Randomisation to the intervention will occur at site level and participants will receive both the control (no text service) and intervention (daily text message and supportive app). The intervention messages will be delivered daily to participant's smartphone; they will also be sent a link to download the supportive app. There will be three waves of data collection across the year, each study epoch lasting 21 days (intervention messages sent on workdays only). The primary outcome measure is Vitamin D level (using blood spot sampling) this will be taken at the start and end of each 21 day cycle (control and intervention). This study will provide important information about the effectiveness of a technology-based intervention to promote sun-safe and healthy behaviours amongst outdoor construction workers.

Oral Presentation

Neurological Effects

0491 BRAIN HEALTH AND AGEING IN RETIRED RUGBY PLAYERS, THE BRAIN STUDY

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Evidence is accumulating on the possible increased risks of neurodegenerative diseases in former contact sport athletes. Each contact sport – with different protections and different playing dynamics – exposes its players to different types of potential

traumas. Evidence suggest that these are not necessarily comparable in terms of pathophysiology, and hence in terms of their potential long-term adverse effects on health. Increasing evidence on poorer general and neurological health among professional sportsmen exposed to repetitive concussions is accumulating; however there is little evidence from rugby players specifically.

This study is designed to assess the associations between history of concussion and general and neurological health in retired elite rugby players aged 50 years or more. We are recruiting a sample of approximately 200 retired rugby players aged 50 years or more and collecting a number of general and neurological health-related outcome measures via validated tests, in addition to biomarkers of neurodegeneration (neurofilaments and tau). We will also carry out a GWAS. This study will investigate the associations between concussion during the rugby career and subsequent measures of healthy ageing and subtle neurological and cognitive impairment. This evidence will be further explored using biomarkers and genetic characteristics of the participants, and investigating which playing history characteristics may be more relevant.

Thus, the study will estimate the burden of physical and neurological health of retired rugby players and will provide initial evidence on possible associations between rugby-related concussion and subsequent general and neurological health. This will both inform current policy, and inform the design of in-depth prospective studies if required.

Oral Presentation

Exposure Assessment

0492 ASSESSMENT OF EXPOSURE TO SUB-CONCUSSIVE HEAD IMPACTS IN FORMER PROFESSIONAL SOCCER PLAYERS

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There is a lack of information on the most appropriate way to assess exposure to sub-concussive head impacts from heading footballs. In terms of relevance for future potential cognitive effects amongst former professional footballers. Reliable quantification of exposure is key to undertaking informative epidemiological studies of cognitive function or neurodegenerative effects amongst former players and is a prerequisite for the design of appropriate interventions to prevent risk of disease. We propose to identify the potential determinants of exposure of chronic sub-concussive head impacts due to heading a football, and how these might relate to the putative disease processes of interest. Information about frequency and intensity of impacts will be collected retrospectively using interviews with subjects, consultation with a panel of former players, analysis of available records, and archive video of games. Important changes that may have affected exposure over time, such as the weight of balls and the pattern of play, will be identified. We will integrate these data into one or more metrics for energy transfer and/or acceleration from head impacts, based on a biomechanical model of the impact process.