unlikely to be helpful unless it is grossly abnormal' following an identically worded conclusion of the report of a Royal College of Physicians working group that had been published a year earlier [14]. However, both publications continued to include it as part of the forms they proposed for routine surveillance of vibration exposed workers. Current guidance from the UK HSE [15] does not include this test as part of the recommended protocol for assessment of HAVS, and the health surveillance forms do not require it to be undertaken.

Review of the literature demonstrates that the Lewis–Prusik test used as part of health surveillance for HAVS has been poorly standardized, which also applies to its use in trauma. Prusik himself is quoted as saying 'in medicine axioms are not rigid patterns. apply today what you have learned, only until advances of science change the basis of opinion on causes, course and treatment of various diseases'. Surely, therefore, he would agree that although the test that shares his name has been tacitly dropped from recent recommendations, the time has come to state clearly that it no longer has a place in the assessment of those exposed to hand-transmitted vibration.

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References

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at different levels of exposure and measures of burden, including attributable risk and quality-of-life measures. The use of these different measures for policy development and regulation depends on the issue of concern. Risk measures, for example, are used by many countries in developing criteria for inclusion of substances in their compensation schemes that recognize the role of occupation in the development of disease. The UK scheme, in common with many others, requires proof that the risk to workers exposed to a carcinogen in a certain occupation is more than doubled in a given occupation, that is, beyond reasonable doubt.

Estimates of burden of disease can identify major risk factors and high risk populations, support decisions on priority actions for risk reduction and provide an understanding of important contributions to health inequalities [3]. Decisions may differ depending on whether one wishes to focus on diseases with a large proportion attributable to substances in the workplace or whether one wishes to target diseases where the number of deaths are highest or, if cancers are involved, where the number of newly occurring cancers (cancer registrations are highest). In the British cancer burden study, the ranking of cancer types changes between population attributable fractions (PAF), deaths (AD) and cancer registrations [4]. The top five cancer sites for PAFs were mesothelioma (95%), sinonasal (33%), lung (14.5%), breast (4.6%) and non-melanoma skin cancer (NMSC) (4.5%). A focus on deaths would perhaps disregard sinonasal cancers that are rare and NMSC that is rarely fatal and include, instead, oesophagus (184 ADs) and stomach (108 ADs), which rank fourth and fifth after lung, mesothelioma and breast. A focus on newly occurring cancers brings NMSC into second place after lung cancer; this cancer may cause substantial morbidity from disfigurement as the lesions tend to be on the head and neck and as the prevalence is high, they represent a considerable economic burden to health services [5]. Attention is also drawn to the large number of newly occurring breast cancers caused by shift/night work (1969, 54% of all female occupationally related cancer registrations), reflecting the improved survival of this cancer [4].

From a public health perspective, the PAF is most useful when the risk factor is clearly causally related to the disease and where interventions are feasible. Risk factors such as personal characteristics, family history of disease or genetic markers are limited in this aspect as they are rarely modifiable [6]. Although the magnitude of the attributable estimates can serve to emphasize the importance of a particular risk factor or effect on a certain disease group, the actual figures are often open to dispute due to uncertainties in the data used. Perhaps more useful for development of risk reduction strategies is the use of ranked lists as illustrated above. One should be aware though that later inclusion of newly established risk factors will affect the rankings, and successful interventions to reduce one risk factor may influence the relative importance of others; this needs to be taken into account when reviewing studies over time. For example, in the non-occupational setting, a comparison of two population-based studies of sudden infant death syndrome (SIDS), one occurring before the risk associated with prone sleeping was widely known and one occurring after there had been wide publicity to encourage parents to lay their babies on their sides or back, not only demonstrated a reduction in SIDS mortality but found that the relative importance of smoking and bottle feeding had increased [7].

In addition, a common interpretation of attributable burden is that the proportion and numbers of deaths attributable, for example, to an occupational carcinogen will avoid deaths and save lives if the carcinogen is removed. As pointed out by Brunekreef et al. [8], deaths are merely postponed and lives prolonged and the effect is on prevention of early disease and early death. Calculation of the years of life lost and years of life lived with a disability (the sum of which gives disability-adjusted lifeyears (DALY)) can potentially inform estimation of the costs and benefits to health of reducing these.

For many substances, there have been general trends for a reduction in measured exposure levels over the last few decades. An analysis of the CARcinogen Exposure database and the UK National Exposure Database found considerable variation in the levels of exposure between substances and workplaces [9]. An earlier analysis of nearly 700 exposure datasets, including carcinogens, worldwide found consistent rates of decline ranging from about 4% to 14% per year. Steeper rates of decline were found for Japan and Eastern Europe compared with North America and Western Europe, for manufacturing industries compared with mining and other industries, and for aerosols and metals compared with vapours [10].

Logically, primary prevention of occupational carcinogen exposure should result in lower cancer rates. However, one of the challenges is how to take adequate account of the inherent latency of many of the cancers, that is, the time interval between first exposure to a carcinogen and the point at which the risk of the cancer first increases. There is a paucity of information about latency periods but evidence suggests that for disease such as leukaemia and other blood cancers, exposure in the 20 years before diagnosis are important, whereas for solid tumours, the risk exposure period can be up to 50 years before diagnosis. Future occupational burden predictions from the British study demonstrate that the legacy of higher exposures in the past will continue to influence attributable cancer numbers for the next 20–30 years [11]. Comparison of forecasts from different scenarios for changes in exposure, such as gradual reduction, complete elimination or stepped reduction in levels through lowering of occupational limits will
facilitate the policy choices for legislators and employers. For Britain, effort focused on small-sized and medium-sized companies and self-employed workers and agents such as dusts, fibres, fumes and gases (e.g. asbestos, silica, wood dust, diesel exhaust, welding fumes), solar radiation, shift (night) work and certain industries such as construction would facilitate the reduction of the British occupational cancer burden [11].

The interpretation of epidemiological studies and the use of the results depend on the quality of the data and conduct and reporting of the studies. The use of study quality tools [12] and transparency of reporting of studies through the use of established guidelines is to be encouraged [13]. The ‘Achilles heel’ of epidemiology is often said to be the exposure assessment. The British burden study was hampered by poor information on the numbers exposed to carcinogens in different occupations and industries and in particular by a lack of data on the numbers exposed at different levels. National data are not generally available nor does the UK have a national job exposure matrix such as those developed in Finland and the USA.

Exposure assessment in epidemiological studies may include direct or indirect measurement, capturing the characteristic patterns of exposure over time and using an exposure metric that appropriately reflects these patterns, for example, cumulative or intermittent exposures. Ideally, all key sources of exposure via all possible routes and all media would be assessed. However, many studies of occupational groups do not attempt to assess exposure from non-occupational sources, a particular problem with a ubiquitous exposure such as solar radiation. Multiple exposures or combinations of low levels of commonly occurring carcinogens will also often occur, particularly in industries such as manufacturing and construction, and could be part of the explanation for persisting patterns of cancer that are otherwise inexplicable. These issues should be addressed in future research.

Poorly measured exposure data may lead to misclassification, which in turn leads to bias toward no effect—the so-called regression dilution problem [14]. Developments in exposure biomarkers and molecular epidemiology should in the future lead to improved exposure assessment methods, with increased specificity, and hence improved ability to detect true differences in disease risk [15]. Molecular epidemiology offers the opportunity to combine the scientific disciplines of epidemiology and molecular toxicology to investigate the interactions between genetic factors and occupational factors in the causes of cancer. These techniques have so far been little used in occupational studies. Future research will need to incorporate measurement of susceptibility and adjustment for the effects of factors which might relate to both health outcome and occupational exposure to carcinogens, such as age, ethnicity, gender, socioeconomic or deprivation status, smoking and access to health care, to aid the investigation of carcinogenic pathways and to detect gene–environment interactions. This will require multidisciplinary collaborative teams involving epidemiology, toxicology and exposure assessment.

In Britain, a relatively small number (14) of carcinogenic agents and occupational circumstances have been shown to currently account for 86% of estimated occupation attributable cancer [4]. Without intervention occupational attributable cancers are forecast to remain at over 10 000 annually [11]. Cancers associated with asbestos, diesel engine exhaust, polycyclic aromatic hydrocarbons, work as a painter, radon and solar radiation are forecast to continue, with construction remaining the prime industry of concern. As pointed out earlier, although exposure levels to the established carcinogens are falling, workers remain exposed at low levels, particularly in service industries, and continue to be at risk; this gives an indication of where prioritization for risk reduction could be focused.

One of the major challenges to occupational health researchers will be the identification and estimation of risks at the expected lower levels. Most cancers, other than those associated with asbestos, are not readily recognizable as occupationally related; in addition, due to the long latency of these cancers, many will not occur until after retirement age. A lack of a complete routine data collection system that includes reliable data on occupation means that occupational health practitioners in industry, hospital and other health service sectors are an important source for the identification of occupationally related malignant and non-malignant disease through, for example, reporting systems such as The Health and Occupational Reporting system. Extension of these schemes, improved awareness of potential occupational exposures among medical practitioners, encouragement to industry to collect mortality and morbidity data on their workforces, even after retirement, and increased pressure to improve the collection of data on occupation within general practice, hospital and cancer registries are essential if we are to continue to identify and monitor future occupational cancer.

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References

All tied up

It happened a couple of times when I left the house without a tie. Such was my horror at the prospect of seeing patients improperly dressed that I had to buy a tie before the clinic started, once from a supermarket and on the second occasion from a charity shop. The outcome was less than sartorially satisfactory and would not have been good for my colleague or patient feedback. I now keep a selection of suitable neckwear in my car and my record of not having seen a patient, at least outside a surgical environment, without a tie stands. But why wear a tie? Why do male occupational physicians appear so attached to them? Even at meetings and conferences half of us wear one (personal observation). They are, after all, a proven occupational health and safety hazard. They should be removed before entering production environments containing moving machinery. They should not be worn or at least be detachable if there is a risk of assault. They are banned in many clinical environments due to their capacity to act as microbial reservoirs. I remember an office worker colleague getting his tie caught in the shredder and whilst it was eventually hilarious, for a while it wasn’t as his head descended towards the revolving metal jaws and his head went puce. He had to be cut free. Even without being garnished by office equipment, research has shown that wearing a tie raises intraocular pressure, restricts cerebrovascular blood flow and may increase the risk of glaucoma and stroke. Only a fool breaks the two finger rule—can you get two fingers between your collar and your neck?

There is some research which shows that how you are dressed has little or no effect on patient satisfaction; in fact other research has shown that patients preferred their general practitioner to be casually dressed. But does this translate to occupational health? There is the expectation and confidence of the employer to be taken into consideration as well as that of the patient (employee) and the employer expects a well-presented service. So this is one of those areas where ‘more research is needed’, a phrase that Occupational Medicine doesn’t have the BMJ’s luxury of banning. Even without an evidence base, this is yet another disease for which being male and getting older are the main and perhaps only risk factors. At the Bear Inn in Oxford, the walls are famously adorned by the amputated ends of more than 4500 ties. The former landlord, Alan Course, began the tradition in 1952 in between working as a cartoonist at the Oxford Mail. He used scissors to collect ties he didn’t have in his collection. In exchange the donor received half a pint of bitter although it isn’t stated whether the donor was always willing or compliant. Maybe the forthcoming Royal College of Occupational Health should initiate a similar scheme and the occupational physician’s personal occupational health and safety hazard can finally be eradicated?

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