

# Research priorities in occupational medicine: a survey of United Kingdom medical opinion by the Delphi technique

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## Abstract

**An attempt to achieve an agreed set of priorities for research in occupational medicine was undertaken by the Delphi technique. Fifty three senior practitioners of occupational medicine in academe (25) and industry or government (28) were canvassed about their views and choices for priority activity. Forty six (86%) responded to the initial enquiry and 48 (91%) provided rank order choices from a second, more detailed questionnaire. The first priority for more research on the natural history of work related ill health identified musculoskeletal disorders of the back and upper limbs followed by asthma, accidents, skin disorders, vibration induced disease, suicide and depression, and finally hearing loss. The second priority area was audit and particularly the need for its use in occupational health screening procedures. Environmental impact of industrial activity was third with the community health effects being more important than individual health effects. Stress related disease was fourth with emphasis on risk factors. The fifth area was neuropsychological effects of work exposures particularly the need for more research on diagnostic tests. Other assorted areas of concern were the cost effectiveness of occupational health, risk assessment, reproductive hazards, the effects of pharmacological agents, and the development of biomarkers as early evidence of an exposure effect. The remarkable degree of unanimity on the issues and choices and the general agreement between physicians from academe and industry on what constitute the priorities warrants further discussion and positive action.**

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The concern to identify research priorities in occupational medicine has been born out of necessity. Although such debate is likely to figure in all academic disciplines from time to time, the crisis in academic occupational health over the past decade or so has focused attention more sharply of late. Between 1975 and 1985, the academic base for occupational health in Britain had been seriously eroded with the demise of the premier establishment in London, as well as staffing and funding difficulties at the Institute of Occupational

Medicine in Edinburgh and the university department in Manchester.

The concurrent establishment of academic centres in Birmingham and Aberdeen and the appointment of academic staff at the universities of Bristol, Cambridge, Edinburgh, and Glasgow as well as three London teaching hospitals has improved the national scene somewhat, but at the same time, the climate of research funding has changed dramatically as well. The much vaunted University Grants Committee report on United Kingdom Academic Occupational Health in 1989 failed to deliver long term funding to any favoured centre and the current trend is to phase out core funding in favour of earned income.

Also in 1989, the Society of Occupational Medicine held a symposium on occupational health research<sup>1</sup> and a somewhat less than successful symposium was held at Green College, Oxford. At the Green College meeting it was clear that occupational health research lacked focus as well as funds, although the one positive outcome was the development of the British Occupational Health Research Foundation (BOHRF) in 1991. To date BOHRF remains in its vulnerable infancy and has still to acquire major sources of cash.

The mid-1980s also witnessed an EC initiative to review constraints in occupational health research.<sup>2</sup> This review of EC member states and a subsequent workshop concluded that the main constraints concerned the deficiency in identifying suitable research topics and the limited value of available information on research in progress, as well as insufficient resources for research and poor "interinstitute" networking for collaborative projects. Yet again, the issue of research priorities was raised but not resolved. Meanwhile, major sources of funds in the United Kingdom such as the Health and Safety Executive (HSE) and large industrial groupings were cutting back on expenditure for both internal and extramural research projects in the face of the deepening economic recession.

The past few years have not clarified matters. Three other potential constraints in the identification of suitable research topics are "lack of flair" on the part of researchers, reluctance of industry to generate or clearly identify research questions, and the absence of a national comprehensive early detection system for occupational health problems.<sup>3</sup> This last issue was highlighted some years ago<sup>4</sup> and the situation has improved with the HSE funded initiatives for the early detection of occupationally related respiratory disease,

urothelial tumours, and skin disorders. Nevertheless, the discussion over occupational health research is in danger of becoming a circular argument along the following lines: The research base for occupational health is weak. The academic departments need more money; money for what?—research; research into what? Who sets the priorities? Academe or industry? Who needs the results?—industry. Who needs to pay?—industry. What research does industry need? Industry seems unsure and pays little to academe for it.

To break the vicious circle, it seemed useful to canvass opinion on perceived research priorities and the advent of the first meeting of the Faculty of Occupational Medicine Academic Forum in 1992 attended by 20 researchers provided the stimulus to proceed. The cost of attending further meetings and the danger that meetings tend to be dominated by a few people with or without interpersonal hostility raised the question of using the Delphi technique to progress matters. The procedure had proved successful in canvassing opinion on a number of issues in the past

and had recently been used by Agius and his group to study priorities for occupational allergy research.<sup>6</sup>

**Methods**

The Delphi technique is essentially a series of questionnaires. The first questionnaire asks subjects to respond to a broad question and subsequent questionnaires build upon responses and seek consensus on priority issues by a system of voting over a choice of topics. The process stops when consensus is reached or agreement on priorities is sufficiently advanced for the planning of a conference to crystallise the issues.

The initial idea was to use the technique to canvass academic medical opinion and 25 subjects were identified as representative of all the academic establishments of occupational health in the United Kingdom including the Professors of occupational medicine in the Army, Royal Air Force, and Royal Navy. Further discussion suggested that as industry was likely to be the main customer for research and its main beneficiary, the

*The choices provided to the responding group for establishing research priorities*

NAME .....

**RESEARCH PRIORITIES IN OCCUPATIONAL HEALTH**

SECTION A: Main Areas		Score (1-5)	Score
1	<b>AUDIT (PROSPECTIVE)</b> — Evaluation of — behaviour modification — benefits of health promotion — clinical reasoning in OH — effects of removal from exposure — pre employment screening — rehabilitation techniques	[ ]	[ ] [ ] [ ] [ ] [ ] [ ] [ ] Score (1-6)
2	<b>ENVIRONMENTAL IMPACT OF INDUSTRIAL ACTIVITY</b> — individual health effects — community health effects — community exposure criteria	[ ]	[ ] [ ] [ ] Score (1-3)
3	<b>INCIDENCE/PREVALENCE/NATURAL HISTORY OF WORK RELATED DISEASES &amp; IDENTIFICATION OF SUSCEPTIBLE GROUPS</b> — back problems — hand/arm vibration syndrome — injuries/accidents — noise induced hearing loss — occupational asthma — occupational dermatitis — suicide/depression — work related upper limb disorders	[ ]	[ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] Score (1-8)
4	<b>NEURO-PSYCHOLOGICAL EFFECTS OF WORK EXPOSURES</b> — effective diagnostic tests for early effects — effective performance tests	[ ]	[ ] [ ] Score (1-2)
5	<b>STRESS AND WORK</b> — identify risk factors/physiological Correlates — develop prevention strategies — develop rehabilitation techniques	[ ]	[ ] [ ] [ ] Score (1-3)

Note A score of 1 is the HIGHEST priority. Use only each number allowed ONCE

NAME .....

**RESEARCH PRIORITIES IN OCCUPATIONAL HEALTH**

SECTION B: Other Specific Areas

		Score (1 to 12)
1	Ageing Worker	<input type="checkbox"/>
2	Agricultural Medicine	<input type="checkbox"/>
3	Biological monitoring—identification of early biomarkers	<input type="checkbox"/>
4	Cost effectiveness of Occupational Health Services	<input type="checkbox"/>
5	Occupational disease in developing countries	<input type="checkbox"/>
6	Pharmacological agents (Therapeutic & Abuse) & work impact	<input type="checkbox"/>
7	Reproductive hazards of work	<input type="checkbox"/>
8	Respiratory diseases—malignant & non malignant causes other than smoking	<input type="checkbox"/>
9	Risk communication and assessment	<input type="checkbox"/>
10	Shift work	<input type="checkbox"/>
11	Standardisation of health records for epidemiological purposes	<input type="checkbox"/>
12	Thermal environment	<input type="checkbox"/>

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ANY ADDITIONAL COMMENTS YOU MAY WISH TO MAKE  
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responding group should be expanded to include occupational physicians working in senior appointments in industry and commerce. Twenty eight chief or divisional medical advisers as well as government regulators were identified covering the full range of occupational health practice in Britain. Thus a list of 53 subjects was drawn up.

The first questionnaire asked the broad question: "What are the three priority areas for further work in the understanding, clinical management, and prevention of occupationally related ill health, and what are the best ways of tackling this work?" After receipt of these responses, it proved remarkably easy to identify five main areas of interest: the incidence/prevalence/natural history of work related diseases, audit, environmental impact of industrial activity, stress and work, and

neuropsychological effects of work exposures. Each broad grouping had a series of subsections ranging from two to eight items. In addition 12 other assorted specific areas were identified by the respondents to warrant a further list.

These areas and topics were listed on a second questionnaire and the respondents were asked to place in rank order the choices provided (table). The summed scores would thus provide a final rank order with the highest priority choice receiving the lowest numerical score.

**Results**

The response rates for the Delphi techniques were 86% (46 respondents) for the first questionnaire and 91% (48 respondents) for the second questionnaire. The responses to the second questionnaire were analysed by summing the rank orders and producing an average score. For example, in the section ranking the five major topics for research the highest priority could produce a score as low as one if all the participants rated that choice as their first choice and as high as five if they all ranked that choice as their last. In practice, such scores are not reached. The ranking scores were subdivided into the responses from the academics (22 of 25 canvassed) and those who work in industry and government (26 of 28 canvassed). Thus for the major topic areas the scores ranged from 1.6 to 3.9 for the academics and from 2.2 to 4.3 for the industry group (fig 1).

Figures 2 to 6 provide the summary scores for the subdivision within those five areas and fig 7 shows the scores for the 12 additional areas suggested by the respondents as worthy of consideration. The figures show a remark-

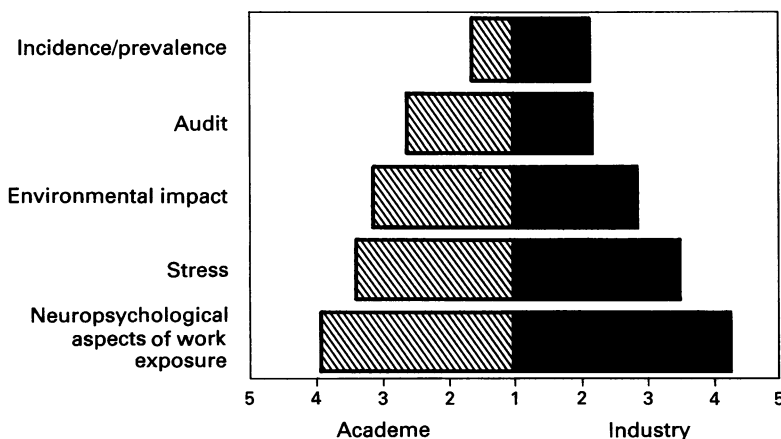


Figure 1 Research priorities in occupational medicine: mean ranking of major topics of research.

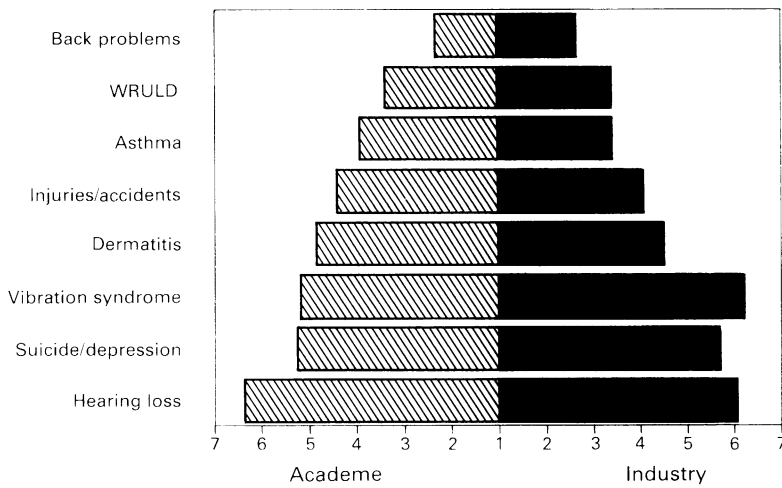


Figure 2 Research priorities in occupational medicine: mean rankings of work related diseases subheadings. WRULD = work related upper limb disorder.

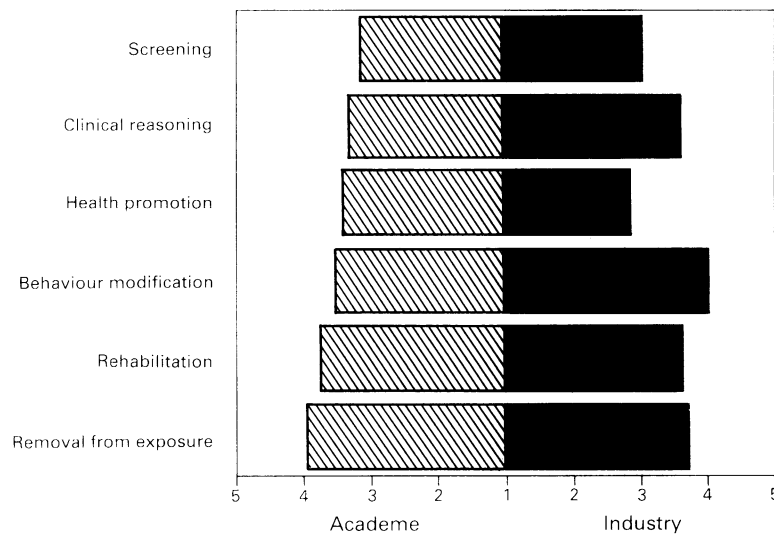


Figure 3 Research priorities in occupational medicine: mean rankings of audit subheadings.

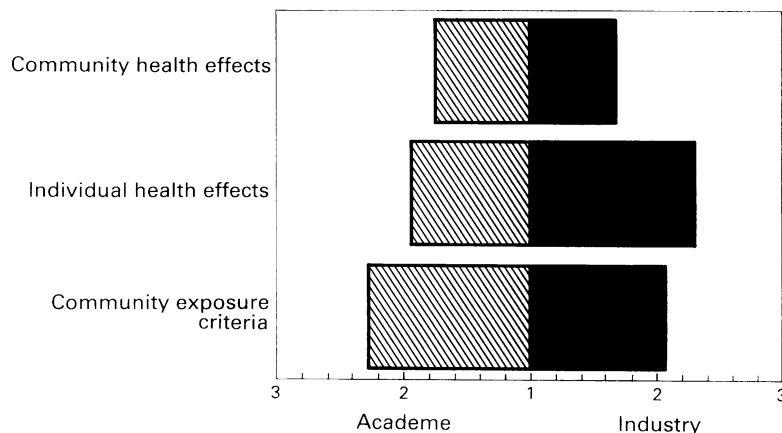


Figure 4 Research priorities in occupational medicine: mean rankings of environmental impact subheadings.

able agreement in ranking between academe and industry for most of the topics and further analysis is unnecessary to demonstrate their consistency.

**Discussion**

There seems to be no previous published report of the Delphi technique being used to review research priorities in occupational health other than the recent review of occupational allergy.<sup>6</sup> The technique has its limitations, at least in part due to the selection of respondents and the use of their views to limit the scope covered in the questionnaires. Respondents commented on some of these issues. For example, ergonomics was not specifically mentioned and the topics covered are more correctly occupational medicine than occupational health. There is also the risk that the process identifies issues of strategic rather than practical importance and that the priorities are viewed in absolute (academic) terms rather than being practical (resource driven). Finally, one senior academic commented that for all the value of the technique she would have to say that her first choice option for the first choice main area would not necessarily be her idea of the most important research topic in occupational medicine. The Delphi technique can be accused of forcing quarts into pint pots.

Nevertheless, the degree of unanimity on the main issues as well as the subsections, coupled with the broad agreement on these priorities between physicians based in academe and industry, warrants further debate and is, in essence, the justification for publication. It would be interesting to compare these views with those of a group of occupational hygienists or toxicologists.

Clearly the most important perceived area for future work, and the broadest sector as well, is further work on the natural history of certain work related disorders. Of these, the musculoskeletal disorders associated with the back and the upper limbs (WRULD) are of paramount importance. The rubric WRULD mainly centred on the relatively clear cut diagnostic categories such as tendinitis and carpal tunnel syndrome rather than the vaguer areas such as shoulder and neck pain or discomfort. There are still large gaps in knowledge of the aetiological and predisposing factors leading to work related disorders of this kind and responders commented on the lack of agreement on appropriate diagnostic tests as well.<sup>7</sup> Aetiological research remains a crucial area of investigation for allergic lung and skin disorders,<sup>6</sup> whereas for vibration induced disease no simple, agreed, or validated test exists to diagnose the disorder.<sup>8</sup> Occupational injuries and accidents are known to be numerically important but insufficient attention has been devoted to the application of rigorous epidemiological principles to research in the area.<sup>9</sup>

Although seven of the eight disease groupings figure prominently in the number of people seeking compensation for industrial

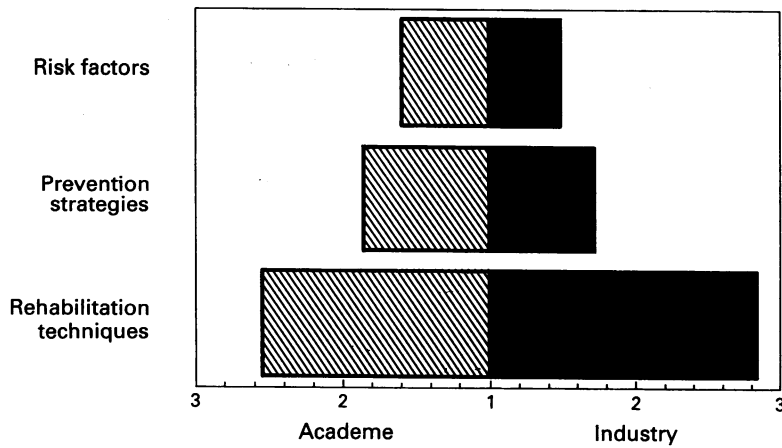


Figure 5 Research priorities in occupational medicine: mean rankings of stress and work subheadings.

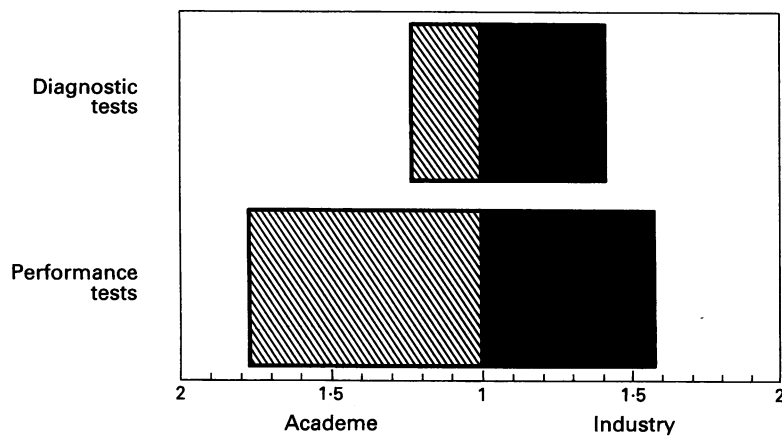


Figure 6 Research priorities in occupational medicine: mean rankings of neuropsychological effects subheadings.

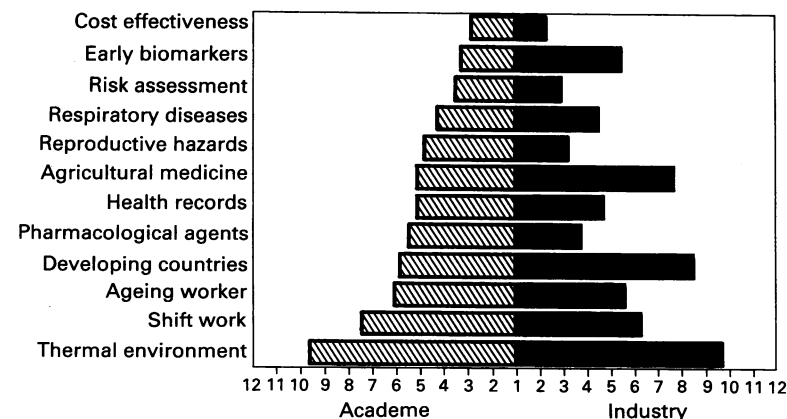


Figure 7 Research priorities in occupational medicine: mean rankings of specific (other) areas.

injury in Britain,<sup>10</sup> the ninth (suicide and depression) has received much less attention and is not compensatable. This is partly due to the lack of clear aetiological links, which has precluded any serious attempt to seek prescription for compensation.

Although audit was the second most important topic so far as the industry based physicians were concerned, its ranking could be more reasonably considered as joint equal first with work related diseases. Audit is practised less than it is discussed. In part, this is due to a misunderstanding of the technique involved and in part due to a failure to implement well described procedures.<sup>11</sup> In this, occupational health lags behind other clinical specialties. Its use in evaluating screening procedures—not just pre-employment screening even though this was commonly cited—and for the related issue of health promotion seem to be the most important areas requiring further research. Clinical reasoning is a summary term meaning the cognitive strategies employed by occupational physicians in the process of diagnosis and subsequent clinical management.

The environmental impact of industrial activity is seen to be a major concern of the responders with community health effects being of particular importance. Claims for the effects of industrial activity on residential neighbourhoods are growing but the techniques for the valid investigation of these claims remain in their infancy. ICI Paints have taken a lead recently to clarify the issues involved and the results of an international symposium<sup>12</sup> suggest that environmental risk assessment is less well developed than health risk assessment. The methodology is not universally agreed or understood but should include life cycle analysis and an integration of health and environmental risks in the overall assessment. Other examples cited by the responders included scientific criteria for judging health impact and developing exposure guidelines such as air quality modelling.

Stress at work remains an important issue with future research effort still largely concentrated on risk factors and prevention strategies rather than rehabilitation techniques. Specifically, responders were concerned to define early adverse effects and to develop a means for objective measurement of physiological correlates of stress as well as “exposure” indices. Occupational health psychology also figures in the fifth, more specific, area of neuropsychological effects of work exposures. Most work in this area has concentrated on the ubiquitous organic solvents but valid techniques for diagnosing the health effects remain in dispute<sup>13</sup> and no appropriate procedure has yet been agreed for screening work based populations for either effect or predisposition.

The assorted 12 other areas worthy of note by the respondents produce a less clear cut agreement on priorities between academe and industry. It could be argued that cost effectiveness exercises, risk assessment, reproductive hazards, the effect of pharmacological agents (due to occupational or therapeutic

exposure), as well as non-allergic respiratory diseases are considered of particular importance. The development and validation of early biomarkers<sup>14</sup> of adverse exposure is an area where mechanistic studies of carcinogenesis, epidemiology, and toxicology could profitably combine as is happening in some centres. This area as well as many others indicate the need for multidisciplinary research approaches.

Two recent research policy reviews, one by HSE Health Policy Division (unpublished 1991) and another by the National Occupational Health and Safety Commission in Australia,<sup>15</sup> come to remarkably similar conclusions to the priorities cited earlier. The HSE as well as noting their need to respond to politically sensitive issues (the sick building syndrome and chronic neuropsychological effects of sheep dip) considered that structure-activity relations in toxicological research, manual handling, and musculoskeletal disorders, and the control of toxic substances at work are key areas of research effort. The Australians list six priority areas: occupational back pain, management of chemicals at work, noise induced hearing loss, skin disorders, cancer, and mechanical equipment injury. An earlier, less structured, survey of 40 employers and trade unions for the Health Education Authority revealed somewhat similar rankings with noise, dusts, muscular, chemical, and reproductive hazards as the high priority areas.<sup>16</sup>

Emphasis in the two recent reports is also given to the need to consider different types of research, each of which requires the collaboration of several scientific disciplines for its successful prosecution. Basic research is needed on aetiological and mechanistic studies of identified priority diseases. Too little is known about the means of assessing quality in occupational health service performance. In addition, methodological development is needed for measurement in the field of biomarkers, risk assessments, regulatory impact, and diagnostic tests. Many of the research areas require well designed large scale epidemiological studies. Virtually all the research needed is applied rather than pure and has wealth creation capability—very much in line with current Government thinking.<sup>17</sup>

In short, it seems that there is some medical consensus in Britain on what needs to be researched and that in many areas this requires a multidisciplinary approach. This, in turn, means well founded and well funded

research groups working closely with the relevant industry and in collaboration with the regulatory authorities. There is also great scope for collaboration between units whether they be in academe or industry. Too often in the past the units have seemed to be unnecessarily competitive. Indeed, one way of solving this difficulty would be to develop a confederation of academic units along Nordic lines working with industry and government on agreed projects. Agreement on these projects might be easier to obtain after this survey, but the funding and the will to succeed remain to be seen.

The whole exercise would not have been possible without the 48 respondents: Professors Blain, Cherry and Seaton and Doctors Afacan, Agius, Aw, Baylis, Baxter, Ball, Brill, Carter, Cox, Coggon, Davies, D'Auria, Deacon, Diamond, Dougherty, Gompertz, Grieve, Harries, Harrison, Hill, Hodgson, Howe, Juniper, Lewin-Smith, Lewthwaite, MacDonald, McKiernan, Miller, Philipp, Paddle, Reid, Rose, Sinclair, Slattery, Slovak, Smith, Snashall, Sykes, Symington, Teasdale, Waclawski, Vaile, Welch, and Wright.

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