





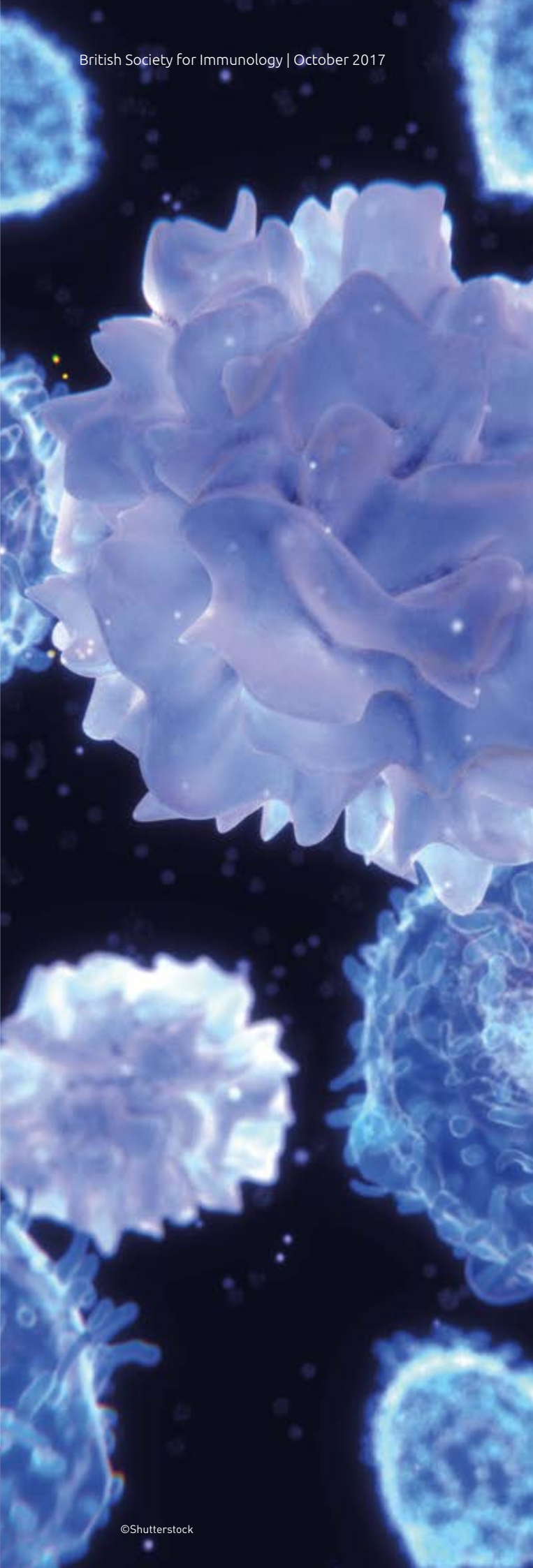
**Miltenyi Biotec**

## **Miltenyi Biotec is a proud member of the British Society for Immunology.**

Immunology has come so far in the last 60 years. It is wonderful to be part of such an inspiring community, working together to understand immunological mechanisms resulting in significant improvements to both human and animal health.

At Miltenyi Biotec, we believe that our employees have a career, not just another job. As we continue to grow, the passion for advancing scientific understanding and addressing unmet needs drives careers in many different directions.

We look forward to supporting the British Society for Immunology in promoting and developing careers in immunology.



# Contents

<b>Executive summary</b>	<b>4</b>
<b>Foreword</b>	<b>6</b>
<b>Introduction</b>	<b>7</b>
<b>Career destinations of immunology PhD students</b>	<b>8</b>
<b>Immunology workforce in UK academia</b>	<b>10</b>
<b>Career survey</b>	<b>13</b>
Introduction and methods	13
Career pathway	14
Career advice, skills and barriers	20
Recruitment and retention	25
<b>Concluding remarks</b>	<b>27</b>



The British Society for Immunology is the leading UK membership organisation working with scientists and clinicians from academia, industry and healthcare to forward immunology research and application around the world. Our friendly, accessible community consists of over 3,000 immunologists, giving us a powerful voice to advocate for immunological science and health for the benefit of society.

The British Society for Immunology's mission is to promote excellence in immunological research, scholarship and clinical practice in order to improve human and animal health. We accomplish this by:

- Working with our members to support current and future generations of immunologists
- Sharing our passion for immunology through meetings, publications and the media
- Building up an understanding of our work by engaging with the public and those working in the research and health environments
- Working with partners in pursuit of our mission, building on common interests.

Find out more about our work at [www.immunology.org](http://www.immunology.org).

# Executive summary

Immunology is a young, growing and dynamic discipline. The innovation is driven by a love and fascination with the subject and the chance to work on scientific problems that are not only of enormous interest in their own right but relevant to the health of our society as a whole. Immunology offers the potential for a highly fulfilling career, with opportunities to work around the world and build fruitful collaborations with like-minded people.

Through this review of the careers landscape in the UK, it is clear that we face several challenges to ensure UK workforce prosperity. Broadly, these challenges can be described under three categories: funding, skills and culture. Solutions need to be found by employers, funders, companies and the many others who work together in these domains.

## Funding

- Reflecting the innovative and fast moving nature of our discipline, the immunology sector employs a high proportion of junior workers. The UK remains at the forefront of immunology research internationally, ranking first amongst the G7 for the quality of our research on immunity and infectious diseases. We need a secure 'jobs pipeline' to ensure that this growth filters through to more senior posts. As the sector grows, we need to continue to attract young researchers through exposure to immunology at different stages. Good training, education, mentoring and a supportive, collaborative environment are key to inspiring a love of the subject amongst students.
- Immunology receives a relatively high proportion of its funding from grant agencies, which play a pivotal role in directing the scientific efforts to attain excellence, building on the strength of the UK's academic immunology research. It is gratifying that a wide variety of funding bodies support the discipline and the current growth that immunology is experiencing. However, the difficulties immunologists face in obtaining continued funding is reflected by poor job security and a lack of tenured positions, themes that recur throughout this report. As immunology extends its reach into other disciplines the sector needs to engage with current and new funders to guarantee future funding streams and to advocate for the creation of more permanent appointments.

## Skills

- As our knowledge of the immune system expands, we need a workforce with a range of skills and knowledge and the flexibility to adapt and make the most of the opportunities afforded by innovations. Immunological societies can work with members across boundaries to assess future research needs and build capacity in specific areas of demand, such as veterinary immunology, to ensure we have a workforce capable of meeting future needs and of translating innovations into health interventions.
- Immunologists realise that they increasingly need a mixture of skills for their careers, both competencies directly related to the quality of science performed and 'softer' skills that allow individuals to succeed in the wider environment. Networking is a key skill which immunologists identify as important, but also as a skill they lack. This is clearly an area of need that the BSI can help to meet through our networks of groups across the UK, Europe and globally.
- Those working in clinical immunology report different needs, skills and barriers compared with those working in academia. The clinical workforce requires a separate targeted approach to provide them with tailored support to advance their careers and to ensure that we hear their voice in discussions. Additionally, a positive recruitment plan is needed to actively attract the best trainees into immunology from the healthcare sector. As decades of investment in basic research delivers new drug candidates, we need additional capacity in translational immunology and clinical trials so that advances can be made available to patients.
- Immunology research in the industrial sector is key component of the future health of the discipline in the UK. Many working in pharmaceutical and biotechnology companies have completed PhDs in immunology. Indeed, those in academia and industry share remarkably similar views on the factors affecting the sector as a whole. More needs to be done to build bridges between the industrial and academic communities at all career stages, both in terms of providing career advice and work experience to early career researchers and providing networking and funding opportunities to encourage joint collaborations.

## Culture

- The report shows a number of barriers to a good career, some of which (for example, fraudulent behaviour was highlighted by 5% of respondents) are concerning and need further research. Survey respondents make it clear that personal resilience and a degree of self-confidence are important for dealing with challenges, both in the lab and outside it. Employers need to appreciate the importance of providing and actively encouraging employees to take up training opportunities and not regard them as an optional 'extra'.
- Working abroad can be a key part of an immunologist's career pathway. The UK benefits from attracting the brightest and the best from around the world, with 42% of immunologists working in our academic institutions being from overseas. Likewise, an important career step for British immunologists is the ability to work abroad at some stage of their career. The immunology community reports significant concerns around the effects of the UK's exit from the EU, with 89% stating that this will have a negative effect on the recruitment and retention of the UK immunology workforce. In the process of defining our future relationship with Europe, we need to promote an agile UK immigration system that encourages bidirectional movement of highly skilled researchers. Continued access to the EU's Horizon 2020 programme (and its successor) and similar funding schemes seems vital in providing support to the UK immunology research base and in contributing our expertise to collaborative projects that would be impoverished by the UK's absence.
- Immunology employs a high overall percentage of women. However, they are disproportionately numerous at junior levels and less likely to hold senior positions than in some other similar disciplines. The sector must investigate the reasons behind this significant loss of talent. A clue is possibly found in our survey results, which highlight several discrepancies between the concerns and experiences of women in immunology compared with men: twice as many women identified sexism, bullying or discrimination as a significant barrier to their career. The sector as a whole needs to intensify efforts to achieve a fair and equal working environment, accessible to all and free from discrimination regardless of gender, ethnicity, disability, sexuality or socio-economic background.

## Broader view

At a time of shifting global politics and the prospect of Britain leaving the European Union, it is critical that the immunology community comes together to ensure that the voice of the sector is heard and clearly understood by decision makers. The UK is a global leader in immunity and infectious disease research, both in the academic environment and in our industrial capabilities. We need to build on these strengths and invest in our workforce, who are the lifeblood of the discipline, to ensure that the excellence is recognised, both at home and abroad.



# Peter Openshaw

## President, British Society for Immunology

Immunology is at the forefront of biological discovery, delivering breakthroughs in our understanding of how the body functions in both health and disease and leading to the development of life-changing therapies for patients.

With this pace of innovation, the shape of immunology is changing. The BSI wants to understand what this means for the varied and complex patterns of immunologists' careers and the skills they need to succeed. For the first time, we have carried out a detailed analysis of the UK careers landscape for immunology, using a variety of methods, including data from UK higher education institutes, tracking those who completed a PhD in immunology and conducting an online survey of those who currently or used to work in the field.

Our findings confirm that immunology continues to be a young and dynamic field. Immunologists are passionate about science, driven by curiosity and innovation, which motivates young people to make their careers in this exciting area. Inspiration from a teacher or role model is a key theme that flows through the report and feeds into our newly launched mentoring scheme and teaching excellence awards.

The rapid expansion of immunology requires a highly skilled workforce: competent, confident and able to grasp new opportunities. It is heartening that immunologists still hold the two major skill needs as critical thinking and good laboratory training. However, transferable skills such as networking and communication are also high on the agenda and we should do all we can to provide training opportunities in these areas. The report also highlights issues around job security and availability of senior positions. This may reflect the fact that we are still a young discipline, indicating a systemic problem that needs to be addressed by employers and funders. The results of this report will help us in collaborating with policy-makers and others who influence the future working environment.

Another important issue is career progression of women in immunology. It is alarming that so many talented young investigators are unable to break through into the higher levels of the profession; women identify different barriers from male colleagues, bringing a specific perspective with regard to skills needed to progress their career. Weathering the sometimes unforgiving environment of laboratory science is crucial. We need to have open discussions about how science can achieve a fair and equal working environment for all.

While extensive, the report cannot provide a complete picture of the dispersed and diverse areas in which immunology is practised. However, it gives us more information than we have had before and clearly indicates the mobility of the workforce, our internationalism, our ambitions and challenges.

Immunologists not only need to be intelligent and well-educated but to also have the skills in critical thinking that are so essential to application of basic knowledge.

We are a truly global workforce. With the expansion of knowledge and the growth of biotech and pharma, this is likely to be an even bigger factor in future. Brexit will have many impacts and we must be ready to capitalise on the changing innovation landscape and opportunities within and outside the UK. There has never been a more important time to be clear about what scientists need and the upcoming changes to the way we work.

What does this mean for the BSI? We hope that the current generation of immunologists, supported by our Society through our networks, meetings, travel awards and projects, will continue to ask us for careers support. Our members see value in belonging to a Society that has considerable resources available to help them. We are a formidable group and we punch well above our weight. We should be proud that immunology remains such an attractive discipline and celebrate that there are so many different job options for those with an immunology qualification. We must ensure that this remains the case, for the sake of the science, innovation, health and industry.

The challenges raised in this report are applicable to many organisations in the biosciences sector, and it is only by working together that we will achieve meaningful and positive change for immunology to ensure that the UK remains at the forefront of research. We encourage those interested in our findings to contact us with their feedback and ideas for how we can collaborate to support the careers of immunologists.

We hope that this report will become a landmark in our understanding of how immunology and immunologists contribute to national and global prosperity. The BSI is proud to be there alongside our members in promoting the future direction of immunology, wherever that may lie. This report will help us greatly in those aims.



**Peter Openshaw**  
President,  
British Society for Immunology  
Email: [president@immunology.org](mailto:president@immunology.org)

# Introduction

The British Society for Immunology (BSI) is the UK organisation that represents scientists and clinicians from academia, industry and healthcare with the aim of forwarding immunology research and application. A key area of our work is supporting current and future generations of immunologists throughout their careers. Given the significant changes that the discipline has undergone in recent years, along with the relative paucity of data specifically related to immunologists' career pathways, the BSI has conducted a landscape review of immunology careers, both to inform our own work and to provide guidance to the sector as a whole.

This project, the first of its kind in the UK to focus on the field of immunology, aims to capture data from individuals working across several sectors, industries and institutions. With input from a variety of participants and sources, we hope to have captured a snapshot of the current immunology workforce across multiple disciplines, providing a platform for further research and investigation.

## The aims of the project were to:

- track the career development and destinations of people who have completed an immunology PhD
- analyse the UK's current immunology workforce in academia
- highlight the varied career pathways available to immunologists, both inside and outside academic research
- identify the challenges and barriers facing immunologists during their career.

This project forms one of the BSI's key strategic priorities for 2016–2020 to 'offer support to current and future generations of immunologists across their careers'. It has resulted, in part, from feedback received in our 2015 membership survey, where the need for more careers support, especially for early career researchers, was identified.

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'With immunology underpinning so many scientific concepts, the subject is now an essential part of healthcare research'

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The project falls into three distinct sections, the highlights of which are summarised in this report. They are:

1. Track the career destinations of people who have completed an immunology PhD in the UK
2. Analyse the current UK workforce in academia
3. Conduct a survey of people who currently work in/used to work in immunology to better understand the career progression of immunologists, how they built their careers and the challenges they faced.

With immunology underpinning so many scientific concepts, the subject is now an essential part of healthcare research. The BSI aims to remain a key source of insight and knowledge for this exciting and expanding field. Through working with the immunology community and gaining this insight, we hope to be able to provide targeted support and guidance to BSI members at all career stages, helping them to fulfil their potential and leading to a stronger immunology workforce. We also hope the findings of this report will be used by others in the sector to inform their work and ensure that the UK continues to be a world-leader in immunological science for many years to come.

The full findings of this report can be found at

**[www.immunology.org/careers-review](http://www.immunology.org/careers-review)**.

If you have any queries on the project, please contact Glyn Jones at **[g.jones@immunology.org](mailto:g.jones@immunology.org)**.

# Career destinations of immunology PhD students

We conducted a search for a random sample of 1,000 PhD thesis authors, who had completed an immunology-related PhD at a UK university between 1975 and 2015. This was extracted from a dataset provided by the British Library’s E-thesis online service (EThOS)<sup>1</sup> database. The search method used was based on that described previously by RAND Europe.<sup>2</sup> The full findings from this part of the work can be accessed at [www.immunology.org/careers-review](http://www.immunology.org/careers-review).

Of the 1,000 PhD thesis authors identified, 158 entries were considered to be not relevant to immunology and were removed. A further 191 individuals could not be traced. This left 651 authors who formed the basis of this analysis; we traced their current position using online tools (Google, PubMed, LinkedIn, ResearchGate and WorldCat). For each person, data were collected to describe their current job title, employer, country and sector of activity (e.g. academia, industry, healthcare, other).

## Overview of authors

The 651 PhD thesis authors identified had conducted their PhD research at 68 different Higher Education Institutes in the UK. 55% of authors were male and 45% female. Research topics were wide-ranging, the most common grouped as being immune response (29%), infectious disease (26%) and inflammation & autoimmune disease (17%). Of the 651 authors identified, 27% received their PhDs between 1975–1999, 33% between 2000–2009 and the remaining 40% between 2010–2015. The high coverage in later years is due to more thesis abstracts being available in EThOS and an increase in the number of people doing PhDs since 2000. Separate analyses of the older and more recent cohorts have been conducted to assess career destinations within these time spans. Some locations were more highly represented in the dataset than others. This was due to variations in the number of EThOS database records submitted by each institution. Whilst this institutional variation limits our ability to conduct institutional comparisons, it will have less effect on using this cohort to analyse the career destinations of UK PhD graduates as a whole.

## Research activity

58% of authors were currently working in immunology research, with a further 16% involved in research roles in other unrelated research disciplines. The remaining 26% were no longer actively involved in research.

## Current location

Overall, thesis authors were now working in 59 different countries. 66% of authors currently work in the UK (figure 1), with 9% in another EU country. The USA was the most popular overseas destination at 10%.

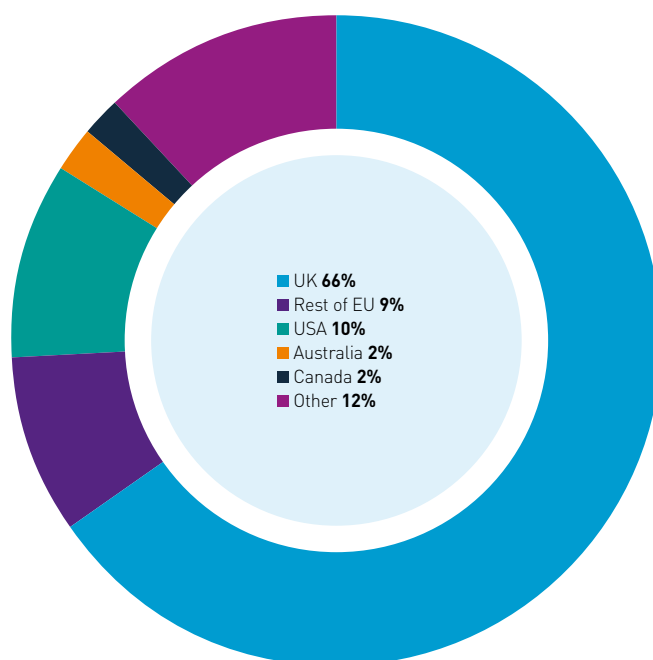


Fig 1. Current destinations of PhD graduates (n=651)

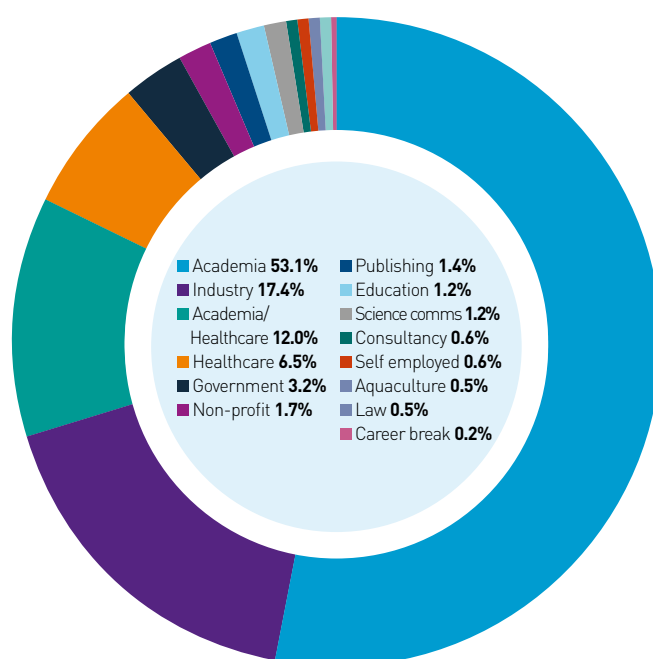


Fig 2. Current destinations, by sector, of PhD graduates (n=651)



### Current destination by sector

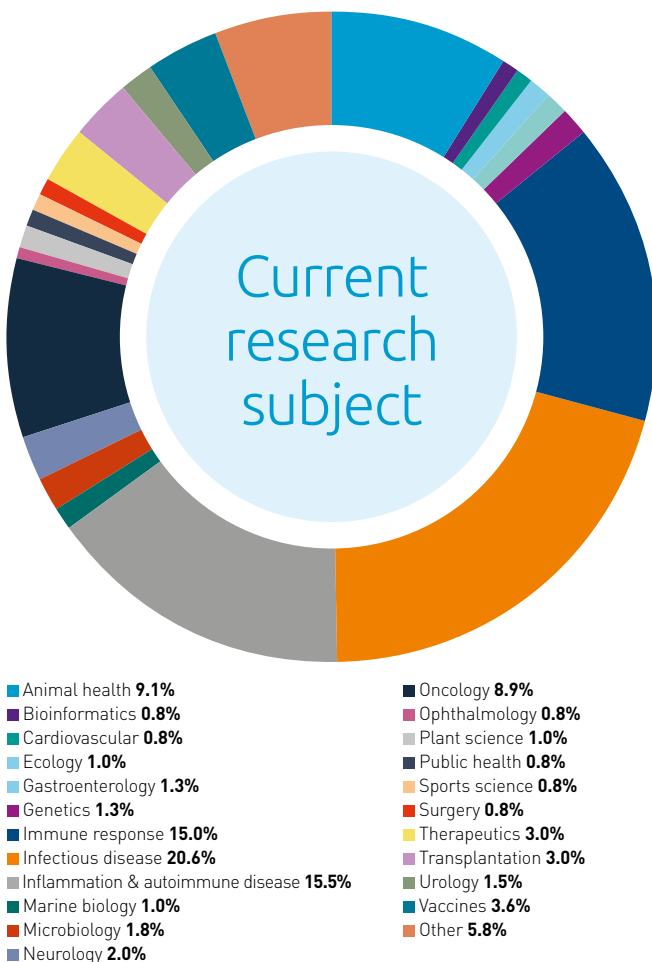
53% of PhD graduates analysed currently work in academia and 17% in industry (figure 2). 7% now work in healthcare and a further 12% had joint positions as clinical academics within both academia and healthcare. When examining the industry sector in more detail, the most common areas of industry cited were biotechnology (44%) and pharmaceuticals (26%).

### Current destinations by organisation

The most common current destinations for PhD graduates were UK universities, with the University of Oxford most popular at 23, followed by University of Edinburgh at 17 and University of Glasgow at 15. However, it is also notable that a significant number of PhD graduates joined GSK, highlighting the importance to industry of immunology research skills gained through PhDs. Such roles feed national prosperity and these data highlight the range and volume of non-academic alternatives.

### Current research subject

As shown in figure 2, 65% of PhD authors pursued a career in academia (including those with joint appointments in healthcare). These individuals currently conduct research into a wide range of subjects, as shown in figure 3.



**Fig 3.** Current research subject for PhD graduates working in academia or academia/healthcare (n=394)

### Summary

Immunology PhD graduates follow a wide range of careers in a diversity of sectors and countries. Although half of our sample pursued a career in academia, completing a PhD is still an important training route for a career in allied sectors such as industry or healthcare. Additionally, some individuals decide to use the skills gained through their PhD to follow a career in a different sector, such as science communication or law. A research career should not be seen as the automatic outcome from completing an immunology PhD; rather graduates should be made aware of the wide variety of careers available to them in which they can use the transferable skills gained through PhD study.

PhD graduates are a highly trained and skilled workforce. Our research shows considerable international movement of graduates, with one third currently residing overseas. This ties in with other findings in this report that working abroad is a key component of an immunologist's career path and efforts must be made to ensure that the international flow of skilled workers both to and from our country is able to continue in the future.

For those that stay in academia, there is huge variation regarding the research topics they go on to work in. As our knowledge of immunology's integral role in many health areas increases, along with the impetus for cross-disciplinary research, there is great opportunity for those who specialised in immunology at PhD level to expand their expertise to bring their skills and knowledge to bear on allied research areas.

1. British Library e-thesis online service (EtHOS) <http://ethos.bl.uk/>
2. Marjanovic *et al.* 2015 A review of the dementia research landscape and workforce capacity in the United Kingdom. RAND Corporation [www.rand.org/pubs/research\\_reports/RR1186.html](http://www.rand.org/pubs/research_reports/RR1186.html)

58%

of PhD graduates analysed are currently involved in immunological research

# Immunology workforce in UK academia

The second task undertaken was to review the roles and locations of individuals working in UK Higher Education Institutions in immunology and related subjects in 2015/16. To action this, data describing academic workforce numbers were obtained from the Higher Education Statistics Agency (HESA). The full findings from this part of the work can be accessed at [www.immunology.org/careers-review](http://www.immunology.org/careers-review).

Analysis of the HESA data indicated considerable variation between universities in how they classified academic staff. For example, some universities classified low numbers of staff in medical or life science subjects, whilst classifying a high proportion in clinical medicine and vice versa. It is likely that numbers of staff working in immunology are underrepresented in this analysis because of this.

## Contract level

The dataset contained 650 staff with immunology as their primary academic discipline (CAD1) and a further 140 with immunology as their secondary academic discipline (CAD2). Staff were distributed across a range of contract levels (figure 4).

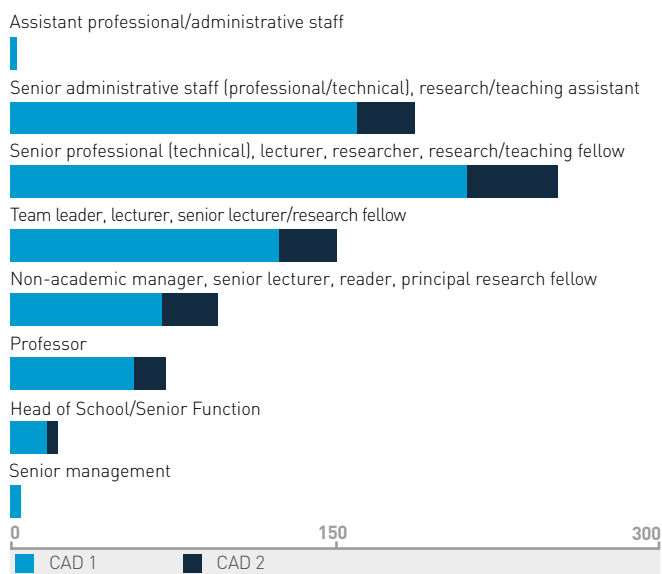


Fig 4. Numbers of academic staff working in immunology by contract level (CAD1 & 2; n=790)

## Research and teaching

68% of academic staff in immunology carried out research only and 30% conducted teaching alongside research (figure 5). This high percentage only involved in research probably reflects the higher than average number of early career researchers in immunology who are supported by grants from agencies external to the university.

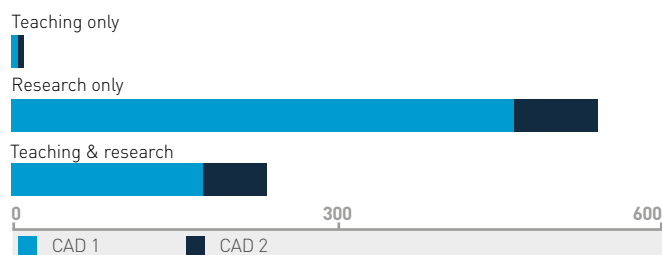


Fig 5. Numbers of academic staff involved in research, teaching or both (CAD1 & 2; n=790)

## Gender

55% of staff with immunology as their primary subject were female, compared with 51% for a wider range of selected subjects across the life sciences and medicine. When looking at gender by contract level (figure 6), fewer than 4% of women in immunology are at professorial level compared with 15% of men. Indeed, a higher proportion of female immunologists have less senior roles at levels such as research or teaching assistants, or research fellows. Further analysis reveals that the proportion of female immunologists in senior positions is lower compared with the number of women in senior roles in other disciplines. Overall, only 23% of immunologists (male and female) are in senior positions (senior lecturer or higher) compared with 30% of staff from all other disciplines selected.

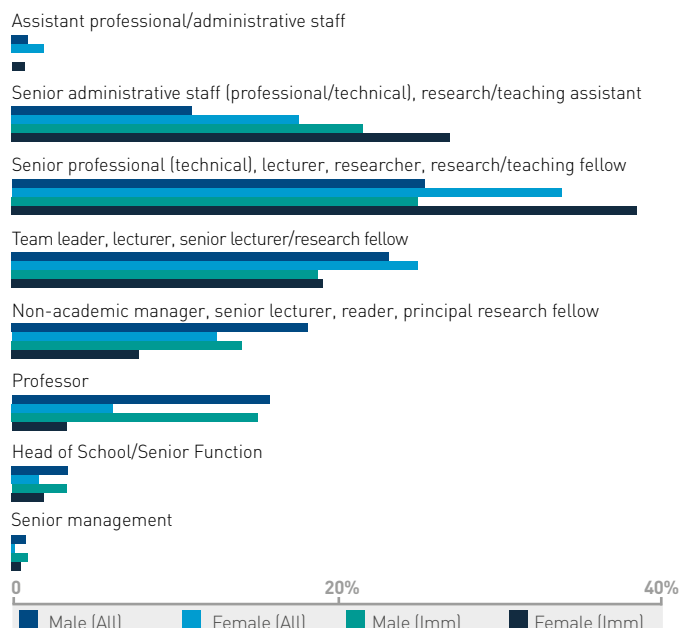
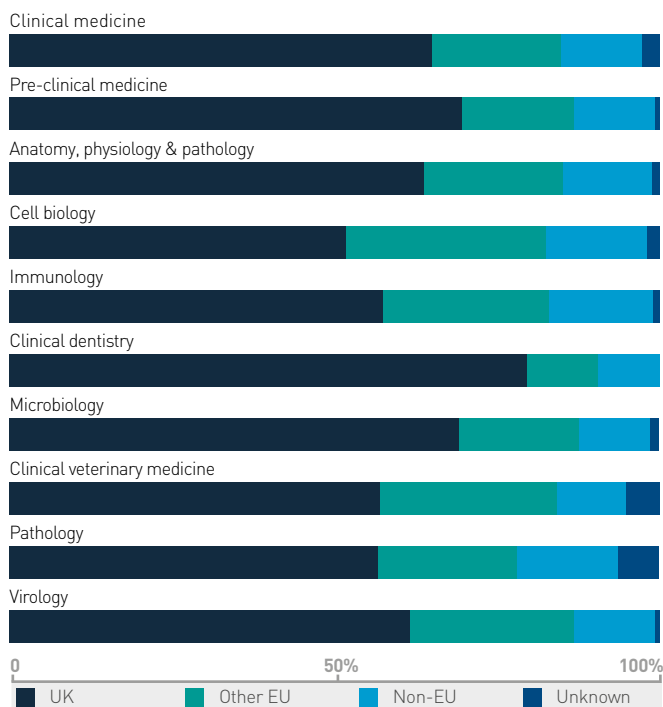


Fig 6. Proportion of academic staff within each contract level by gender, working in immunology (CAD1) and all selected subjects (including immunology; CAD1).

## Nationality

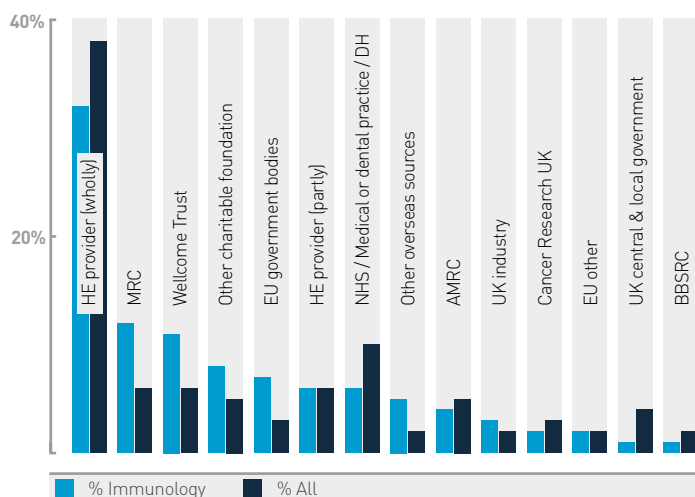
58% of immunology staff were from the UK and 26% were from another EU country. Figure 7 shows that immunology, in comparison with other subjects, attracts one of the highest proportions of staff from outside the UK.



**Fig 7.** The nationalities of academic staff working within a range of academic disciplines (CAD1; n=12,030).

## Source of basic salary

Compared with other subject areas, a higher proportion of immunology staff (47%) received funding from the Medical Research Council, Wellcome Trust, other charitable foundations and EU government (figure 8) compared with other disciplines (32%). In contrast, fewer immunologists were likely to receive their basic salary directly from the Higher Education provider.



**Fig 8.** The source of basic salary for academic staff working in immunology compared with all academic disciplines (including immunology) in the dataset (CAD1).

## Summary

Immunology is a young and growing discipline as evidenced by the high number of staff in early career positions, who are attracting higher than average amounts of funding from agencies external to their university. However, this growth of the discipline at early career levels has not yet fed through to the creation of more senior roles (senior lecturer or higher), with only 23% of immunologists in these positions compared with 30% of staff from other disciplines. This is concerning for the future health of UK immunology research as it's crucial to retain expertise within the sector if it is to fulfil its potential. Further investigation is warranted to elucidate the reasons behind this lack of senior positions and develop a strategy to ensure that the UK is not only training the brightest and best scientists, but also maximising their potential to provide the opportunities for them to remain in immunology throughout their careers.

Whilst there are strong numbers of women working in immunology, they are less likely to hold senior positions than in other disciplines. This drop off in workforce diversity is concerning and represents a huge loss of talent to the UK research environment. Action should be taken to develop a wide-ranging strategy to identify and address the issues responsible for women leaving the discipline and not progressing to the top levels.

Immunology is an international science with a high proportion of staff from outside the UK. This represents a huge strength to UK immunology, evidencing that we attract high levels of talent from around the world. However, the discipline cannot be complacent. With current changes in the political sphere (including Brexit), we need to ensure that, in the future, the UK has an agile and efficient immigration system that welcomes expert international talent to contribute towards our research base.

Immunologists receive more funding from external agencies compared with other disciplines. This difference may be partly explained by the finding that a higher proportion of immunologists are in junior positions and are therefore more likely to receive their basic salary from grant funding rather than from their university. However, with the discipline growing at a steady rate, it underlines the important role played by these external agencies in ensuring the overall strength of UK academic immunology research.

Immunology research is more reliant on funding from EU government bodies than other disciplines. Continued access to the EU's Horizon 2020 programme (and its successor) is very important to the UK immunology research base and in contributing our expertise to collaborative projects that would be impoverished by the UK's absence.

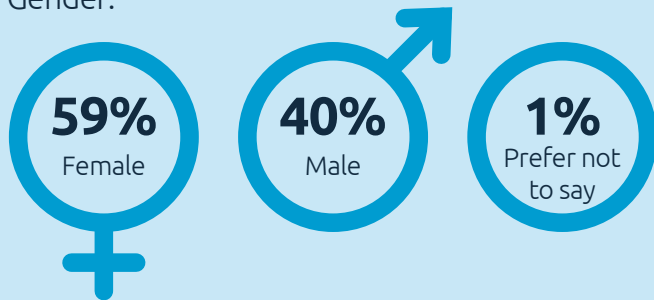
# Career survey

The British Society for Immunology commissioned independent market research consultants to develop and deploy an online careers survey. The aim of this was to reach up to 1,000 people who are currently working or used to work in immunology to find out more about their career trajectories, their experiences of working within the discipline, how they view the overall health of the UK immunology sector and how they feel the BSI's resources are best directed towards career support. The online survey launched in mid-June 2017 and ran for six weeks until the end of July 2017. The survey link was distributed to BSI members as well as to non-members via a range of communication methods, including promotion via social media and relevant stakeholders. The results summarised here represent highlights of our findings. The full survey results can be found on our website at [www.immunology.org/careers-review](http://www.immunology.org/careers-review).

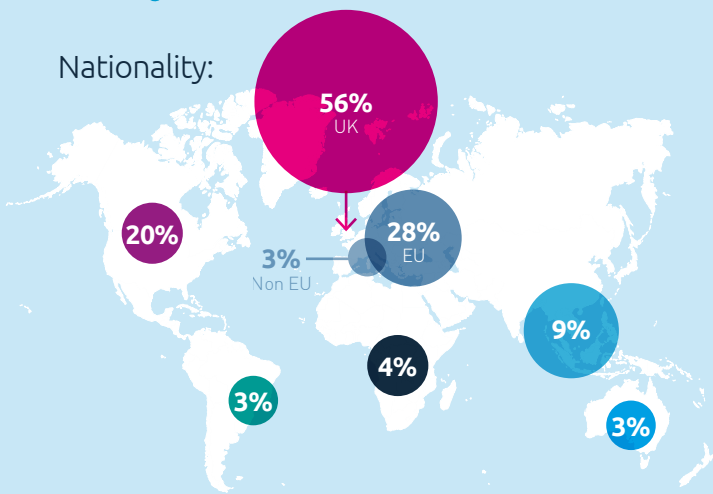
## Who answered the questionnaire

We received 1,260 responses with 969 people completing the whole survey. This is a completion rate of 77%, above average for this type and length of survey. The key breakdown information on respondents can be seen below.

### Gender:

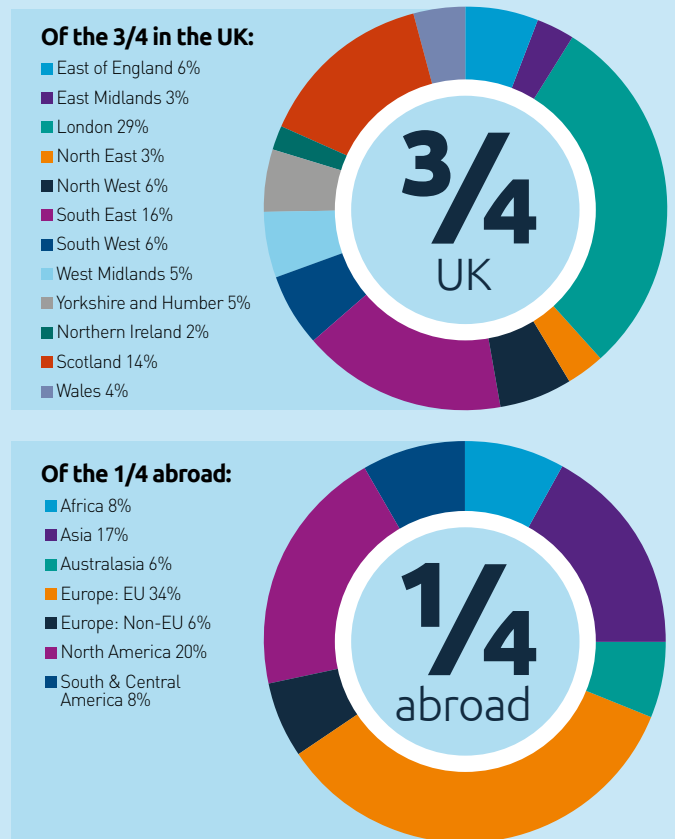


### Nationality:

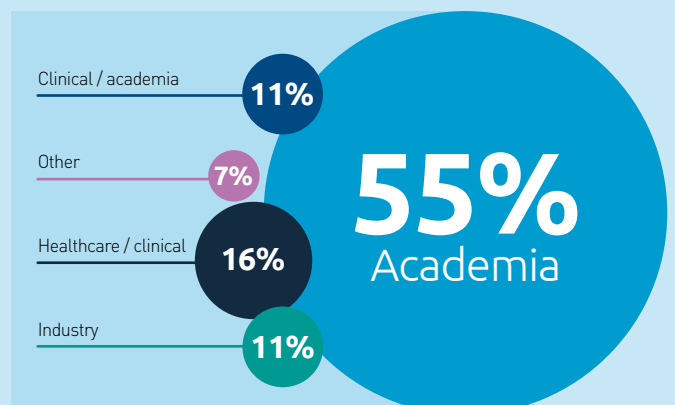


We have calculated the Maximum Margin of Error based on the conservative estimate of 969 respondents. The Maximum Margin of Error at the 95% confidence level is  $\pm 3.15\%$ , well within the industry standard of  $\pm 5\%$ . This means that if 50% of respondents selected a given answer, it is possible to be 95% certain that the true value will lie between 46.85% and 53.15%. More information can be found at [www.immunology.org/careers-review](http://www.immunology.org/careers-review).

### Current place of work:



### Work Sector:



# Career pathways

To stay competitive on a world stage, immunology needs to be viewed as an appealing career proposition, offering a stimulating career pathway with options to specialise and for personal and academic growth. With a global sector growth rate of 4% per year,<sup>3</sup> immunology should be proactive in selling itself as an attractive career option to maintain and grow its workforce, to support the needs of both academia and industry and, importantly, to continue to draw in the brightest and best students into the field. In this section, we take a look at what attracted immunologists into the discipline, how their careers have progressed, and the areas of immunology that interest them.

## Inspiration

What inspired you to become an immunologist?

Top five responses were:

33%

Worked on an immunology project during MSc/PhD and enjoyed it

24%

Inspired by a teacher/supervisor

24%

Worked on an immunology project during undergraduate studies and enjoyed it

22%

Fell into it by accident

21%

Curious to find out more about the field

Respondents could select two options

Overall, it's the subject of immunology itself that encouraged people to enter the discipline rather than the more general considerations of job availability, financial rewards or prestige. This is a positive for the sector as it implies that the current workforce is passionate and engaged with furthering the discipline. It also highlights that promotion of the subject area itself is likely to be the most fruitful route to attracting new talent.

To attract people into immunology, the sector needs to inspire them at every level, from undergraduate onwards. It's important that efforts are not just targeted at one point in the career ladder, but rather that a more long-term approach is developed to provide students with experience of immunology at multiple points in their training.

Almost a quarter of respondents were inspired by a teacher or supervisor, showing the importance of developing mentors and communicators who can motivate the next generation with their enthusiasm and knowledge of the discipline.

A higher percentage of those from healthcare/clinical (42%) reported falling into immunology by accident compared with those working in industry (15%) and academia (19%), indicating that a more positive recruitment plan is required to actively attract the best trainees into immunology from the healthcare sector.

## Case Study

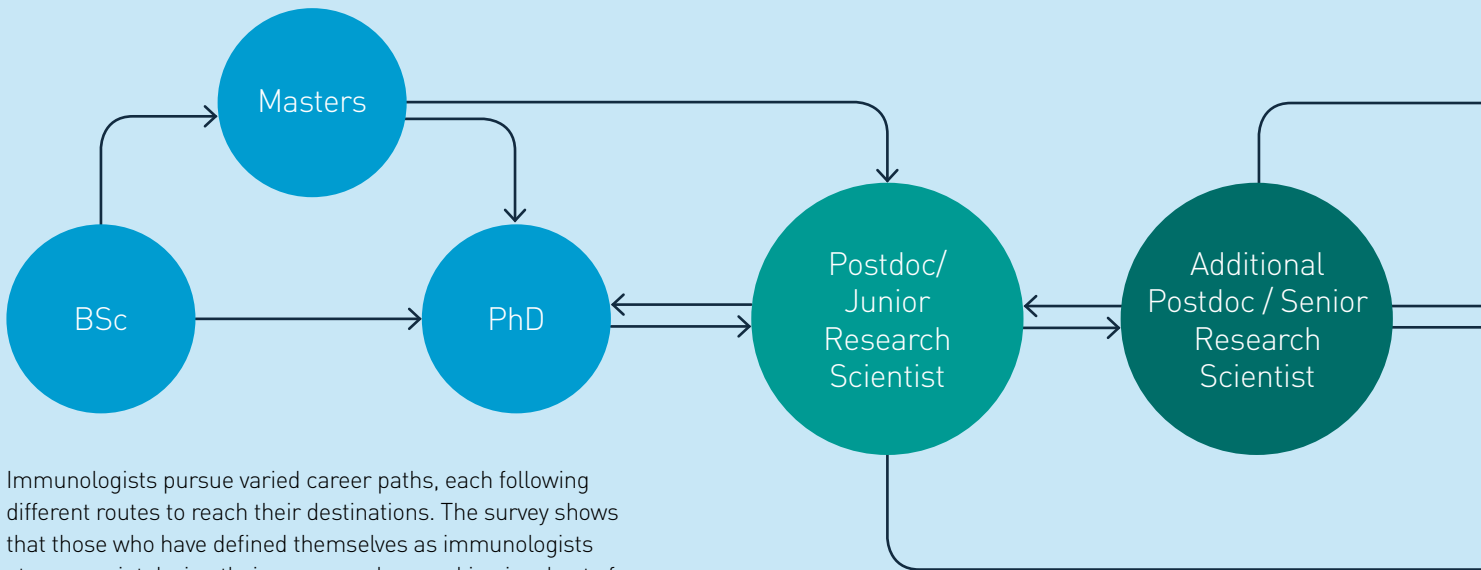


"I had always been interested in medical research. After a placement at a pharmaceutical company I decided that I wanted to pursue immunological research in an academic setting so applied for funding to undertake an MSc and PhD."

**William Branchett**  
PhD student  
Imperial College London

3. GBI Research 2017 Global Immunology Drugs Market to 2022. <http://bit.ly/2wTi0q9>

## Career pathways



Immunologists pursue varied career paths, each following different routes to reach their destinations. The survey shows that those who have defined themselves as immunologists at some point during their career end up working in a host of different disciplines and industries. Here, we have summarised the most popular academic career pathway outlined by respondents in the survey (Figure 9).

Fig 9. Common career pathways followed in academia

However, a key finding of the survey is that an academic career is not the automatic outcome of studying for a PhD in immunology, rather that studying immunology equips you with skills that provide the foundations to work in numerous different sectors, carrying out a wide range of roles and responsibilities both within and outside of science. In Figure 10, you will find examples of the wide range of jobs that a number of respondents who now have a career in other sectors hold, including those who still work within the discipline of immunology and those who have moved on to other sectors.

**IP manager**  
**Flow cytometry specialist**  
**Healthcare advertising**  
**Patent attorney** **Laboratory manager**  
**Scientific publishing** **Business analyst**  
**Clinical trials manager** **Grant manager**  
**Secondary school teacher**  
**Sales manager** **Water microbiologist**  
**Government research** **Army officer**  
**Campaigns & policy officer**  
**Scientific marketing** **Bioinformaticist**  
**Science writer** **Operations manager**  
**Science communications**  
**Specialist nurse**

Fig 10. Examples of non-academic jobs pursued by those who have studied or worked in immunology

## Case Study

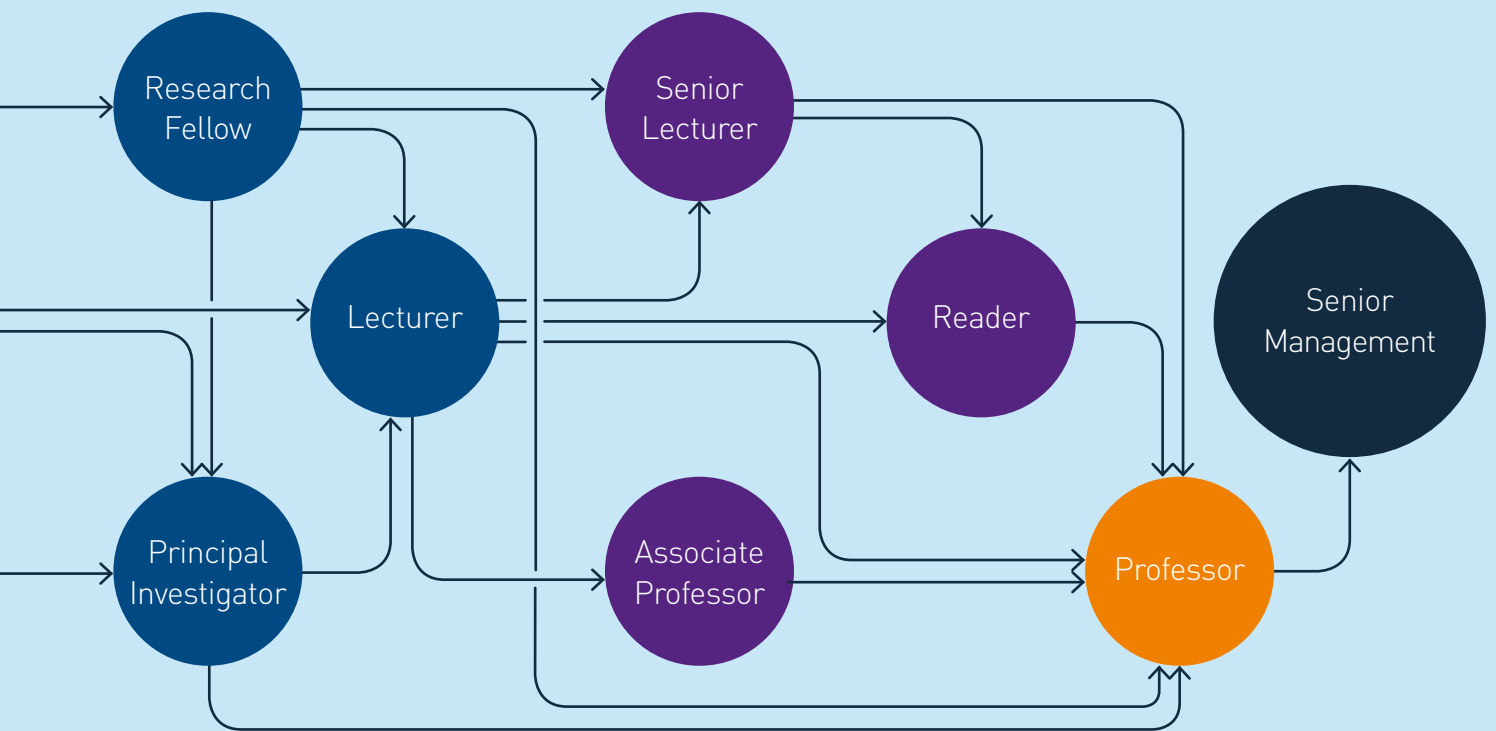


“I have many fond memories from my time in the lab. However, I realised that a career in academic research wasn’t something I was cut out for. Despite this, I was keen to stay involved in immunology in some capacity. I had developed a real passion for

the subject and was saddened by the thought of no longer being involved in the field.

“With this in mind, I decided to explore opportunities in scientific editing. If I’m completely honest, I didn’t really appreciate what this entailed and I was pretty lucky in obtaining the first job I applied for — an editorial role with *Nature Reviews Immunology*. Seven years later, I am still with the same journal and really love my job. I think it is perfect for someone who enjoys reading about the latest immunology research on a daily basis, but doesn’t have the resilience to be the one generating the data themselves!”

**Yvonne Bordon,**  
Senior Editor with *Nature Reviews Immunology*



## Case Study



"Throughout my BSc and Masters, I felt that I was in a tunnel driving towards a lab-based career. When I stopped to consider my next step, I evaluated what I enjoyed from the lab and what I didn't. I found the conceptual science behind the research fascinating, and I enjoyed

collaborating with inspiring scientists and explaining my research to others.

"My current position as Policy & Public Engagement Officer at the BSI combines my interest in immunology with working in a sector that is topical and still academic in many ways. I'm still closely connected to the science, but with a different perspective. I work with a range of inspiring and influential people – scientists, clinicians, MPs, funders, the public – to discuss immunology and work towards valuable end-goals on specific projects. From this, I am constantly learning how to communicate science to a wide audience and how to tailor projects to a targeted group. It's an incredibly fascinating and fast-paced position to be in!"

### Shannon Lacombe

Policy & Public Engagement Officer,  
British Society for Immunology

## Case Study



"I am currently completing my clinical immunology training in Newcastle. Immunology is an incredibly fast-moving specialty, and this is an exciting time to be involved. The work of a clinical immunologist is enormously varied including a mix of direct clinical work, along

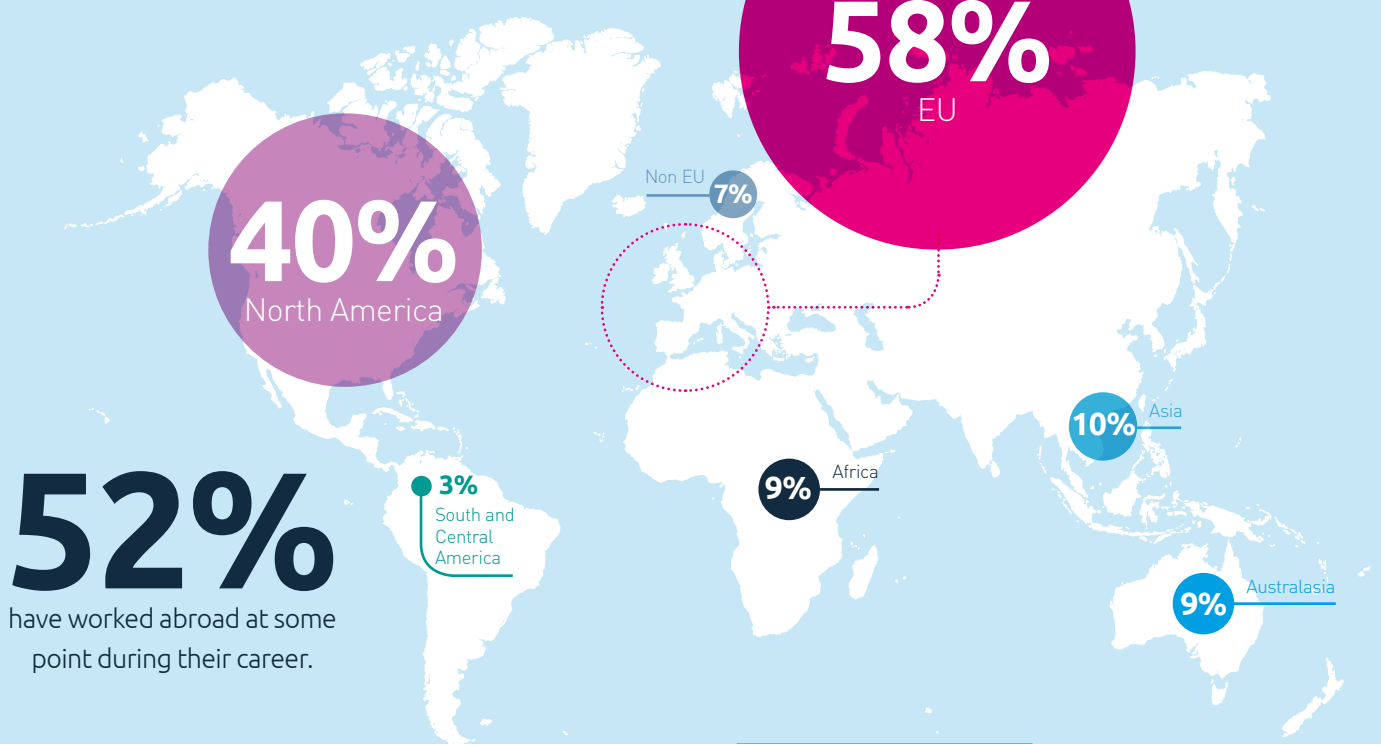
with laboratory time, liaison with other specialists, audit and/or research. The ability to think on your feet and succinctly communicate the meaning behind complex findings are important skills that we need to develop.

"I find one of the most rewarding aspects of clinical immunology is the multidisciplinary nature of the work. We work closely with nursing staff, biomedical and clinical scientists, academics, and other medical specialties. We are constantly exposed to and interacting with colleagues with a great diversity of skills and experience, from whom there is always so much to learn."

### Stephen Boag,

Clinical Immunology trainee, Newcastle-upon-Tyne

## Working abroad



The UK has a proud history of welcoming and benefitting from the contribution of foreign scientists. This open and welcoming reputation has brought about an internationally mobile workforce, particularly in biomedical science, and nowhere is that truer than in immunology. Moreover, internationalism has also been linked with increased scientific productivity<sup>4</sup> and an increase in citations.<sup>5</sup> However, current uncertainty around Britain’s future relationship with the EU, and what it may mean for immigration rules, mean this is a priority policy area.

Of our respondents, 52% had worked abroad at some point during their career, indicating this international approach is a key part of an immunologist’s career pathway. The only area where this does not hold true is the healthcare/clinical sector, where only 26% of respondents had worked abroad compared with 59% in academia, 58% clinical/academia and 46% in industry. However, for those involved in basic research, the ability to work in different countries is taken up as a career step by a significant proportion of workers.

Further analysis indicates that immunologists are particularly likely to have worked abroad during the early stages of their career, especially at PhD (36%) and postdoctoral (48%) levels. These career stages often coincide with a time when immunologists are likely to take short-term contracts and have reduced job stability. Therefore, it is crucial that we develop an agile and effective immigration system that supports the UK’s ability to recruit and retain the very best high value workers, while also facilitating the movement of UK researchers to work in other countries.

### Case Study



“There is no doubt that working abroad changed my life. I always wanted to work abroad, and immunological skills are in global demand. Having finished my PhD in London, I moved to Philadelphia for my first postdoc. While there were some challenges, I have

never regretted the move. My five years there gave me a wider perspective on my work, introduced me to new techniques, and new collaborators. I became intellectually independent. I met my wife. I made friends who have continued to travel, further widening my opportunities for collaboration and holidays. Much of this could have also happened in the UK, and I can’t know whether working abroad really helped my career, but I definitely enjoyed the experience!”

**Simon Milling**  
Professor, University of Glasgow

4. Manville et al. 2015. *Characteristics of high-performing research units.*

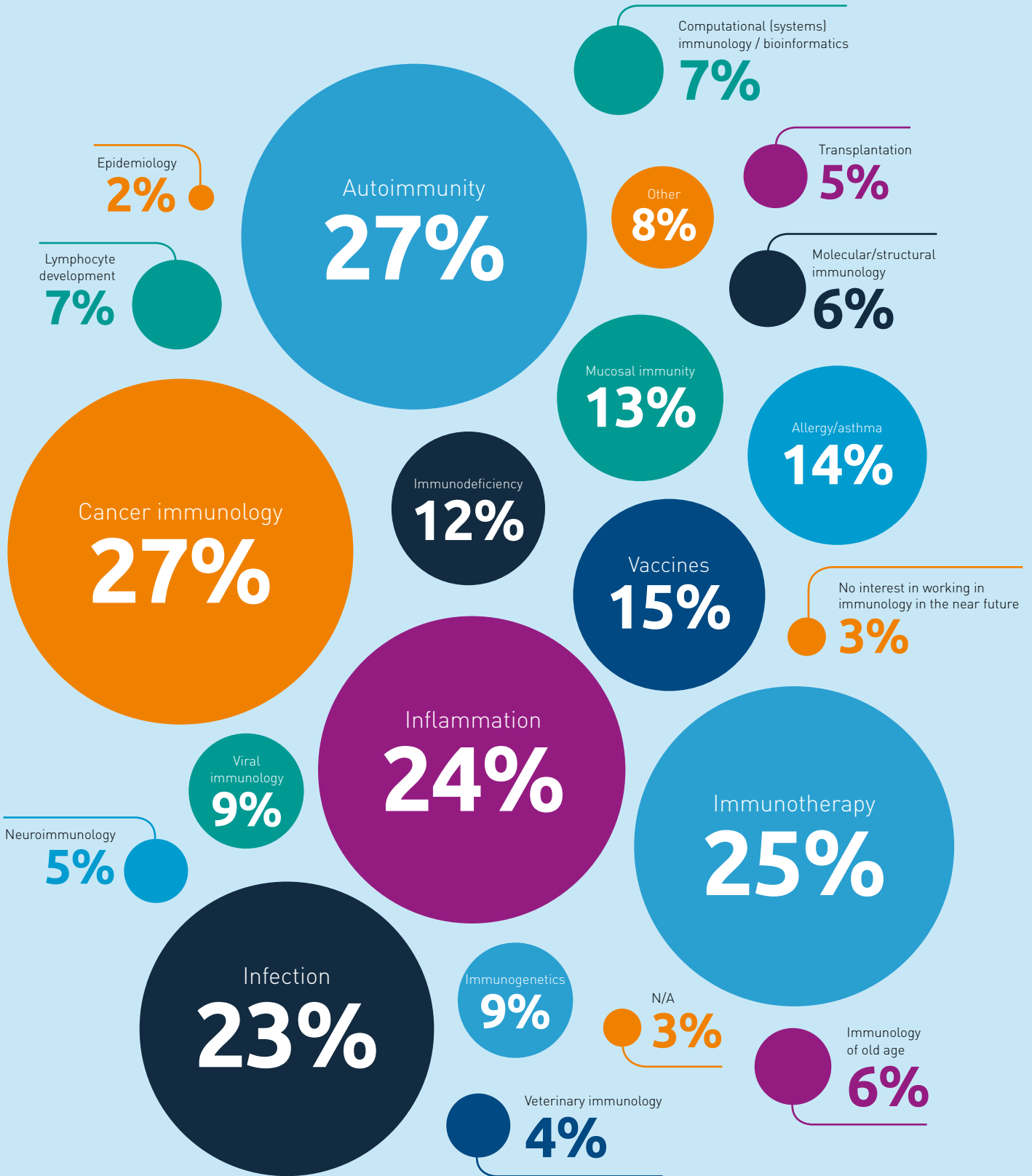
Prepared for the Higher Education Funding Council for England

5. Sugimoto et al. 2017 *Nature* 550 29–31



## Future areas

In what areas of immunology would you like to work in the near future?



Respondents could select up to three options

## Future areas (cont.)

Immunologists are interested in working on many different topics in their future career, which bodes well for the health of the discipline. Our knowledge of the immune system is expanding rapidly, both in terms of detailed understanding of the molecular mechanisms involved and the number of diseases and healthcare areas in which immunology is implicated. As our understanding of the importance of the immune system in health and disease evolves and new fields of research open up, we need to have a workforce with diverse skills and knowledge who can adapt and expand into these new areas, making the most of the opportunities afforded by new innovations.

The survey reveals significant differences between workers from different sectors as to where their future research interests lie. For example, compared with those in academia, individuals employed in industry show an increased interest in immunotherapy (41% vs 23%), autoimmunity (36% vs 24%) and cancer immunotherapy (50% vs 29%). These are areas where decades of investment in basic research is now paying off with translational work ongoing to develop drug candidates for treatment.

The data also highlight areas crucial to our future health, which those working in industry currently do not show a high propensity for compared with those in academia. These include topics such as infection (9% vs 30%) and mucosal immunology (7% vs 18%). Continued investment from government and charities, particularly to these areas, is key to ensuring that we persist in making forward strides in our knowledge to prevent and treat disease related to these areas.

Interest in inflammation is a cause of concern. Recent research has implicated inflammation in a huge variety of medical conditions not traditionally linked to the immune system including Alzheimer's disease and mental health. Although overall 24% indicated inflammation as an area of future interest, among healthcare/clinical staff, this figure plummeted to 1%. To build on the basic research already conducted and bring new treatments to patients, we will need to increase interest and expertise in inflammation in the immunology healthcare setting in future years.

Veterinary immunology is a key area of research for safeguarding our future health. It is important both in terms of ensuring livestock health to protect food supplies and to research infections that have the potential to cross species boundaries and infect humans. For example, recent outbreaks of Ebola and MERS were both initiated by the infectious vector jumping the species divide. Our survey indicates that only 4% of respondents are interested in specialising in veterinary immunology. Given the huge research need in this sector, this is a worryingly low figure and consideration should be given as to how to attract more people into this area.

## Summary

Love of the subject of immunology is key to attracting students into the discipline. We must maximise the amount of exposure to immunology that students receive at different points in their training to build this appreciation of the subject. This effort goes hand in hand with training effective mentors who can encourage more of the brightest and best to pursue a career in immunology.

Although the data show immunologists can be found working in a huge variety of jobs, the pathways by which individuals reach these positions are not always apparent to those at the start of their careers. Action should be taken to showcase the multitude of jobs available to those who study immunology.

Immunologists have diverse research interests. However, efforts must be made to build capacity in specific areas of demand, such as veterinary immunology. The sector must ensure immunologists have the skill sets and knowledge to adapt to the changing research landscape and fill areas of academic need.

The UK needs a streamlined and effective immigration system to facilitate international movement of researchers to work in our institutions. Many British researchers also spend time working abroad, a key stepping stone in immunologists' careers. Efforts must be pursued to ensure that the UK's future immigration agreements with foreign countries continue to allow this fluid transmission of workers from the UK.

## Case Study



"Strategic investment in veterinary immunology, and particularly veterinary vaccinology, is the way forward in supporting a future global 'one health' agenda. Humans and animals are interdependent for food, companionship, environment and health. An expanding human global population is putting increasing demands on food security and food safety, particularly as the majority of emerging human infectious diseases have their origins in animals, with antimicrobial resistance only adding to this challenge."

**Gary Entrican,**  
Group Leader, Moredun Research Institute

# Career advice, skills and barriers

Immunology is a broad discipline in which recruits can follow individualised career pathways, developing highly specialised skill sets along the way. In this section, we concentrate on the factors that contribute towards the unique career pathway followed by each individual. This includes themes around the quality and content of careers advice, the importance of skills in building a successful scientific career and the barriers that immunologists face throughout their careers.

## Careers advice

How would you rate the career advice offered to you at each career stage?



Our findings paint a mixed picture of the careers support provided to immunologists. Although the survey shows that the quality of advice and support appears to increase as individuals progress through their careers, it's important to note that some of the lower figures reported at early career stages may be historical as we have not analysed these responses according to current career stage. Although we would hope that careers advice at undergraduate level is of a higher standard today than indicated here, it is a

What was the most beneficial careers advice you received and from whom?

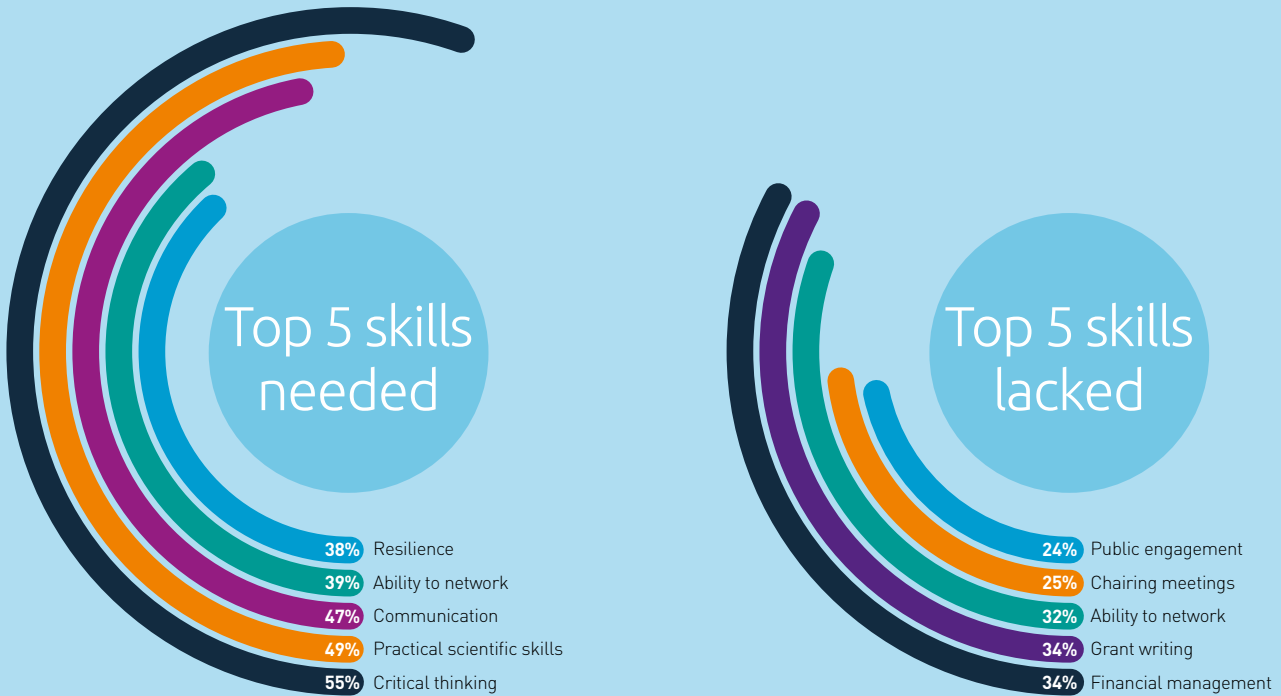


key area for further investigation, particularly given the importance assigned in earlier responses to inspiring young scientists into the discipline at this career point.

The survey highlights that advice on career pathway is seen as particularly critical to early career researchers, with this guidance being imparted from a variety of individuals. This reinforces the importance of training senior immunologists to become mentors to inspire and advise the next generation.

## Skills

Which skills have been most important during your career and which skills have you lacked?



Respondents could select up to five options

### Case Study



“Being self-motivated to get in the lab and to read papers every day when you are working by yourself on a project is very important. Tenacity and organisational skills get you through a PhD! I was also lucky to do my PhD and postdocs in supportive labs with supervisors who helped with my career development as well as with the science.”

**Emily Gwyer Findlay,**  
Royal Society Dorothy Hodgkin Fellow,  
University of Edinburgh

These responses are varied, highlighting both areas (such as critical thinking and practical scientific skills) that are related to the actual scientific work and areas (such as networking and resilience) that are more relevant to the wider working environment. The answers indicate that to build a successful career in immunology, respondents feel it’s important, not just to carry out high quality science, but also to develop more transferable skills that allow them to operate successfully within their workplace and build successful collaborations.

The full survey results show significant differences between the skills identified as important and lacking by clinical/ healthcare professionals compared with other career sectors. Although much of this variation is predictable based on job remits (such as an increased emphasis on communication and people management skills), it shows that this sector may benefit from tailored training opportunities to address the unique challenges faced.

The full dataset shows a remarkable correlation between the skills that respondents felt were least important to their careers and the skills they felt they most lacked, and vice versa. Further work is needed to assess whether this is because respondents don't feel the skills they lack are important and therefore have made little effort to gain them, or whether they would value these skills more highly if given training in them.

The exception to this is ability to network which was identified as the fourth most critical skill to have at 39%, but with 32% of respondents highlighting this as a skill they lack. This makes networking a key area where training, experience and opportunities can be provided to immunologists to help them further their career.

There were some gender differences noted in the skills needed, with women showing a propensity to prioritise communication (50% vs 42%) and time management (31% vs 20%) compared with men. However, men prioritise critical thinking (60% vs 52%) and paper writing (42% vs 31%). This backs up previous research showing women in academia place greater emphasis on more collaborative skill sets and activities,<sup>6</sup> and is an important factor to take into account when looking at future equality and diversity initiatives.

That 38% of respondents chose 'resilience' and 32% chose 'overcoming tough work situations' as important skills highlights the complex nature of scientific careers and the fact that many immunologists face tough barriers to overcome in their career paths. A more in-depth analysis of what these barriers might be is discussed in the next question.

## Case Study



"As a PhD student, your project takes up a lot of your time, and sometimes controls your whole life. But, as an early career scientist in immunology, I think it is important to be aware of the opportunities in your field and surroundings.

Therefore, I have made networking an important priority and use it to meet as many people as possible – those who have been there and done it, people who have done the complete opposite of what I have in mind, and people who can introduce me to a different world of science/immunology.

"For an early career immunologist, it is important not to be scared to meet people, even those in a much higher position. It is a great opportunity to level yourself up and mature in your field. All of this is so important for putting yourself in a good position when you finish your PhD. Generate your network, let people know what your strengths are and prepare yourself for the next step."

**Fane Mensah ,**

Third-year PhD student, University College London

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# 39%

identified networking as one of the most important skills to progress their career

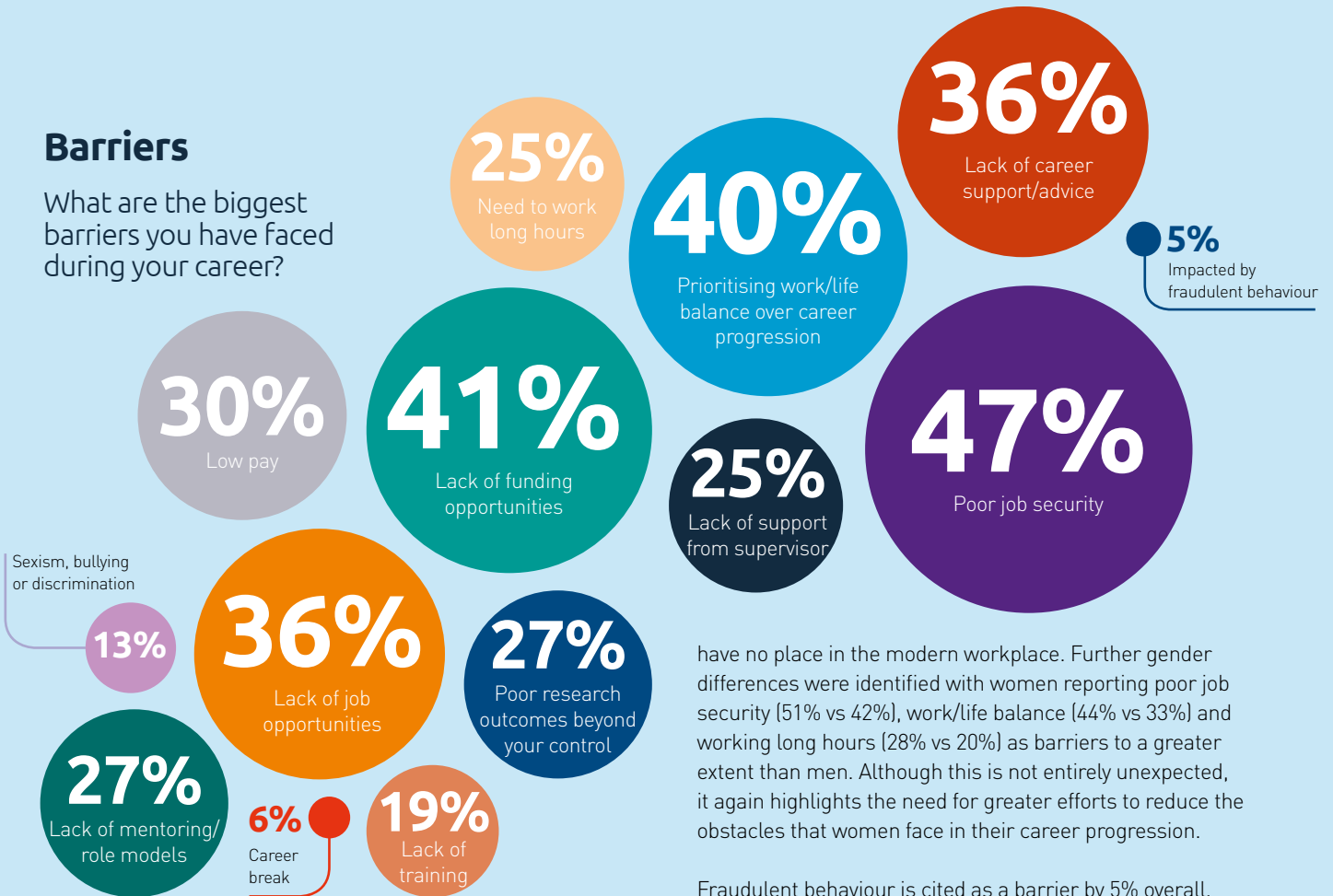
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# 32%

identified networking as the critical skill that they felt they lacked

## Barriers

What are the biggest barriers you have faced during your career?



The variety of topics raised by significant proportions of respondents reflects the diversity of immunology careers and shows that immunologists are facing many different challenges to their career progression. With growth in the immunology sector meaning recruitment and retention of these highly trained individuals becomes ever more important, this represents a significant challenge for the sector as a whole to address these different barriers.

Overall, poor job security and lack of funding opportunities were identified as the largest barriers, particularly by the academic community. These are factors which must be addressed at a sector level to ensure we have a system that is fit for function to train, retain and support specialist researchers.

Again, the full survey results indicate significant differences between the barriers faced by those working in healthcare/clinical compared with other career sectors, with lack of job opportunities cited by 50%, but poor job security and lack of funding cited by only 17% and 28%, respectively. Although much of this variation is based on career pathway and structure, it shows that a tailored approach is needed to address the issues faced by immunology professionals working in this sector.

Moreover, 1 in 8 respondents (13%) stated that sexism, discrimination or bullying was a significant barrier they had faced during their career, with women reporting this as a factor twice as frequently compared with men (16% vs 7%). From the survey, we are unable to assess how recent these incidents are, but bullying and discrimination

have no place in the modern workplace. Further gender differences were identified with women reporting poor job security (51% vs 42%), work/life balance (44% vs 33%) and working long hours (28% vs 20%) as barriers to a greater extent than men. Although this is not entirely unexpected, it again highlights the need for greater efforts to reduce the obstacles that women face in their career progression.

Fraudulent behaviour is cited as a barrier by 5% overall. Any concerns around issues of this nature should be taken seriously. Further work is needed to find out more detail about the nature of these concerns and their effect on the UK research environment.

## Case Study



“The visibility of female role models in science is very important because it encourages young female researchers. That is something that I think institutes are beginning to address by having mentor schemes in place for women. I am part of mentor schemes at Queen Mary, both as a mentor and a mentee, which has already been extremely helpful. What is difficult currently is that there are so few senior female academics and it places a huge burden of responsibility on them. However, I don’t think that women necessarily always need to have a female mentor and institutes should be encouraging senior male academics to engage with these mentor schemes as well. All senior academics have experienced very different career paths and if they could engage more with these mentoring schemes it would be beneficial to everyone.”

**Louisa James,**  
Lecturer, Queen Mary University of London

## Factors for success

Which factors are the most important for an immunologist to succeed/progress in their career?

51%

Support from employer to develop new skills and experiences

37%

Greater job security

30%

Being stimulated/engaged with your subject

28%

Establishing collaborations and attending networking opportunities

25%

Financial support

25%

Mentoring

24%

Confidence in your own scientific ability

20%

Luck

Respondents could select up to four options

## Case Study



"An academic career is not always straightforward. With short-term contracts, the pressure of getting grants and of publishing fantastic papers, it often feels that 24 hours in a day is not enough. In addition, most of us have many other commitments/interests/dreams in life besides work. I am (in no particular order) a mother of two small kids, a daughter, a wife, a sister, a friend, a house owner and a cat owner, at the same time as being an academic scientist. With all those 'roles', you often feel that that you are not advancing on any front. There is no universal solution to how to manage your work-life balance, but to accept that time is precious and that the different 'roles' will require various degrees of commitment at different times. As both life and science constantly take you in unexpected directions, you just need to do your best and go with the flow. Importantly, remember to enjoy yourself along the way!"

**Cecelia Johansson,**  
Senior Lecturer, Imperial College London

The answers to this question reflect many recurring themes from the survey overall, including the importance of mentoring as well as being engaged with the topic you are studying.

Professional development is seen as the most important factor in career progression by some margin. Immunologists from all sectors and disciplines should have access to appropriate training to build their experience and knowledge. Employers also need to recognise the importance of providing and actively encouraging employees to take up these opportunities. Although this survey provides some insight, further work is needed to ascertain the exact training opportunities (particularly in scientific skillsets) that would be most beneficial to provide.

51%

said support from their employer to develop new skills was important for a successful career

Transferable softer skills, such as confidence and networking, are also highlighted. Many successes in immunology rely on collaboration, and it's important that researchers take the time away from the bench to build up these skills, maximising professional interactions through networking opportunities and mentoring to build the relationships that will set them in good stead for their future careers.

Women identify flexible working and greater job security as higher priorities than men (18% vs 6% and 40% vs 31%), whereas men identify financial support as being more important to career progression (34% vs 20%).

One-fifth of respondents thought that luck was a significant factor in progressing their career. This reflects a feeling from some in the profession, particularly expressed in the section on 'barriers', that no matter how hard they work, their success is ultimately out of their hands. Work needs to be done to ensure that the system rewards excellence fairly and without discrimination. Those who shine in their chosen immunological career path should be fairly rewarded.

## Case Study



"Academia is extremely rewarding, but it also challenging. There are lots of hurdles, disappointments, setbacks, rejections, crises and disasters. Brilliance, a perfect postdoctoral publication record and green fingers in the lab will only get you so far; you need

persistence, resilience and stubborn determination in the face of these challenges. My other tip would be to take time to step back and enjoy what you are doing: if it isn't fun, there are plenty of other ways to work hard for a living, many of which pay more for fewer hours!"

### John Tregoning,

Senior Lecturer, Imperial College London

## Summary

A mixture of skills is viewed as important to a successful immunology career. Respondents identified critical thinking and practical scientific skills as the key skills required – both competencies directly related to the quality of science that an individual performs. Immunology is a collaborative science, and softer skills, such as communication and networking, were also highlighted as allowing individuals to succeed in their wider working environment. Appropriate training opportunities should be put in place to allow immunologists to build their skill sets in these diverse areas. Employers should also recognise the importance of actively encouraging employees to take up these options.

Networking was identified as an important skill, but also one that many immunologists lack. This is a key area where the sector can take action to not just provide training, but also more opportunities for immunologists to practise these skills. With the increase in cross-disciplinary collaboration, the ability to make these partnerships is only going to increase in the future.

The full survey shows that clinical/healthcare professionals in immunology have specific needs, both in terms of their skillsets and the barriers they face. A tailored approach should be adopted to specifically target the needs of this part of the workforce. As immunology is linked to additional areas of healthcare and disease, building up capacity and knowledge in the clinical workforce will become a priority to ensure that we can bring new targeted treatments from the bench to the clinic.

We must redouble efforts to ensure that immunology is a discipline that is open and accessible to all. The survey highlights several discrepancies between the concerns and experiences of women in immunology compared with men. The sector as a whole needs to intensify efforts to achieve a fair and equal working environment, accessible to all and free from discrimination, irrespective of gender, ethnicity, disability, sexuality or socio-economic background.

Immunologists have a wide variety of concerns around factors that affect their career progression. It will be a significant challenge to the sector to address all of these. Given the huge changes currently taking place to the UK research environment, such as the establishment of UK Research & Innovation, the sector is now in a unique position to revisit scientific career structure and funding and set out a roadmap to address these key obstacles in researchers' careers and ensure that immunology maintains its highly specialised and expert workforce.



# Recruitment and retention: what works in immunology?

In immunology, the factors that have a bearing on the ability to recruit and retain employees are many and are interwoven with the health of the wider scientific landscape. Our survey asked respondents a range of questions about their perceptions of the environment in the UK, relating to the political situation, funding opportunities, training and job opportunities outside the UK.

It is important to bear in mind that we do not currently have evidence that there is a 'glut' of immunologists in the market or that there remain many unfilled posts, either in academia or in industry. However, there is still a general lack of analysis in this area. Anecdotally, our members tell us that it is increasingly difficult to obtain a tenured position in academia because of the lack of principal investigator or lecturer posts.

We asked a range of questions relating to which factors respondents felt might have a positive or negative impact, or no impact at all, on the recruitment and retention of the immunology workforce in the UK. When analysing this question, we removed responses where the respondent had replied with 'not applicable' from the subsequent analysis.

## Britain leaving the EU

A sizeable majority, 89%, felt that the referendum decision in favour of Britain leaving the European Union would have a negative impact on the recruitment and retention of the immunology workforce in the UK. Those working in academia (92%) were considerably more concerned about this than those working in healthcare-related roles (76%). Only 10% of respondents thought there would be no impact.

## The number of tenured positions available at universities

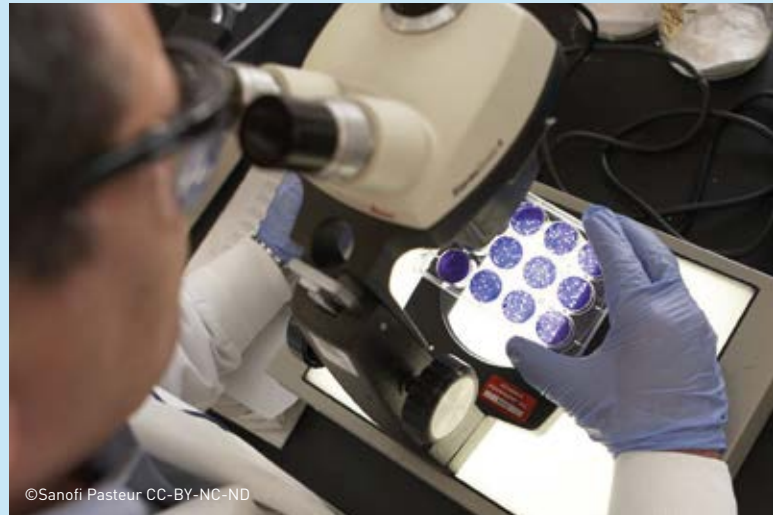
68% of respondents thought that the lack of availability of senior posts in universities would make recruitment and retention harder, with 22% disagreeing and seeing the number of positions as a positive factor. Women had more negative views on this question with 72% stating the number of tenured positions at universities was a negative compared with 61% of men.

## The quality of research in the UK

Three-quarters of respondents thought that the quality of research being carried out at British universities would be beneficial for attracting and retaining a skilled immunology workforce. Academics were more likely to be positive about the pull of research quality, at 80%, than those in healthcare, at 57%.

## The availability of funding for research

There are clearly concerns about the access to research funds, with more than half the respondents, 61% overall, feeling that the availability will have a negative impact on recruitment and retention in the UK.



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# 89%

felt Britain's departure from  
the EU would have a negative  
impact on the immunology  
workforce

# 75%

felt the quality of research  
at the UK's universities  
is beneficial in attracting  
and retaining a skilled  
immunology workforce

However, 36% of respondents overall felt far more positive, particularly those from outside the UK, and said they thought that funds for research would be a draw, and have a positive impact.

#### **Training skills and development opportunities**

Of those that responded, 59% think that training and development opportunities in the UK would help with recruitment and retention, while 26% see this as a negative point. However, respondents who work in healthcare/clinical areas had a more split view with 41% saying that they would have a positive impact on recruitment and retention, compared with 43% in this group seeing them as negative. This possibly points to some differences in how training opportunities may be taken up within the NHS.

#### **The state of the industrial jobs market**

Over half, 60%, of respondents felt that the industrial jobs market in the UK would have a beneficial effect on efforts to recruit and retain staff. This is a view that is reflected by those currently working in industry as well as those from academia. However, one-quarter said the opposite, and saw it as a negative.

#### **Job opportunities outside the UK**

Asked about the effect of the job opportunities outside the UK on retaining the UK workforce, 59% of respondents thought that there would be a negative effect on recruitment and retention of the UK immunology workforce. Only 1 in 5, 21%, stated there would be a positive impact.

When looking at the differences of those living inside and outside the UK, a lower proportion of those not currently living in the UK (49%) think the impact will be negative, compared with those currently in the UK (61%).



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## **Summary**

The survey paints a mixed picture of immunologists' perceptions on the recruitment and retention of the UK's immunology workforce. Most respondents are concerned about the impact of Britain leaving the EU, which is coupled with the perception that, in the future, job opportunities available abroad might have a negative impact on retention of immunologists in this country. However, these negatives are balanced against the observation that the quality of research in the UK is high and will help to attract staff, and keep them within the workforce. The BSI would like to see far more emphasis placed on communicating the strength and unique qualities of our research base, both to decision-makers and to those who live and work abroad as this is a core 'pull factor' for a talented workforce, able to work in a global marketplace. With the jobs in the immunology sector growing year on year, it's important that the UK develops a strategy to provide the opportunities to attract and retain these highly skilled workers.

The majority of individuals feel that the number of tenured positions available in the UK is likely to be a negative along with the availability of funding. This reflects findings elsewhere in this report that immunology currently has fewer tenured posts than comparable disciplines (see page 10). For UK immunology to flourish, it's crucial that we retain expertise within the sector and further investigation is warranted to work out the reasons behind this lack of senior positions and develop a strategy to maximise the UK's recruitment potential.

Overall, people from academia and industry gave similar responses to all questions as to how they felt each issue would positively or negatively affect recruitment and retention when looking at the sector as a whole. Although much is sometimes made of the differences between those from academia and industry, immunologists from both have many factors in common, which shines through in their answers to these questions.

The clinical sector does, however, differ in their perceptions, particularly around the state of training and development, with respondents on the whole feeling less positive. This may reflect on recent NHS changes to training, or the availability of specialist skills training as they progress through the specialty training programme. More work needs to be done to understand their perception of the risks, particularly as the demands upon clinical immunologists are likely to become greater as new therapies come to the clinic for many different groups of patients.

# Concluding remarks

The British Society for Immunology is the UK membership organisation that represents scientists and clinicians from academia, industry and healthcare who form the UK's immunology workforce. As such, we felt that we were ideally placed to carry out this landscape review of UK immunology careers. Although this report cannot provide a complete picture of the many diverse areas in which immunology is practised, it is the most comprehensive piece of work carried out on the sector's workforce so far and provides a snapshot of which areas immunology is excelling in, as well as some pivotal challenges facing the discipline.

Immunology's greatest strength is its engaged and dynamic workforce. We should not lose sight of the fact that it is the people who make the discipline what it is. Although this report mainly focuses on sector statistics, careers are all about individuals and any future strategy to tackle careers in immunology needs to place the individual at its heart.

## BSI's strategy

The BSI is ideally placed to address some of the issues raised by this report, and indeed, under our new strategy, we currently have plans in place to develop our work in many relevant areas. The pilot of our mentoring scheme launched this year with the aim of bringing together early career researchers with those already established in the field to provide an independent source of support and advice in making decisions upon future career paths. 2017 also sees the launch of our inaugural Immunology Teaching Excellence Award, which aims to reward excellent communicators who show a passion for the subject and can inspire the next generation of immunologists.

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'Immunology's greatest strength is its engaged and dynamic workforce ... careers are all about individuals and any future strategy to tackle careers in immunology needs to place the individual at its heart.'

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Networking featured high on the skills agenda for immunologists in our survey and the BSI has several initiatives in place to allow researchers to build, refine and practise these skills. This includes our 35 Regional and Affinity Group networks, which bring together researchers from different geographical and subject areas to learn from each other and build their expertise. Our travel grants and summer placement awards allow members to travel to conferences and labs around the world to increase their networks, knowledge and skill sets. Additionally, our Summer School brings together early career researchers with those established in the field build networks and learn new skills.

## Wider collaboration

The findings of this report will not come as a surprise to many currently working in immunology; in fact, several results, particularly around job opportunities and funding, back up anecdotal reports that we have received from our members for some time. Many of the findings have wide-ranging implications and the BSI cannot tackle them alone. We see this report as the first step in a much bigger process of enabling and building collaborative partnerships across the sector to start to address the issues raised.

Immunology is one of the jewels in the crown of UK biosciences and we are globally recognised for the excellence of research. We need to be open about celebrating and rewarding our successes. In order for Britain to maintain its position at the forefront of immunology innovation, we need a workforce that is engaged, supported and fit for function. Although this report throws up many challenges, they are not insurmountable.

We hope that the UK's bioscience sector will find this report of interest and that the community, both individuals and organisations, will send us their feedback on our findings and ideas for what can be done to resolve some of the issues highlighted. The BSI feels strongly that it is only by building collaborative partnerships across the sector that we can come together to support the careers of immunologists and strengthen our discipline as a whole.

# The British Society for Immunology's mission is to promote excellence in immunological research, scholarship and clinical practice in order to improve human and animal health.

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