

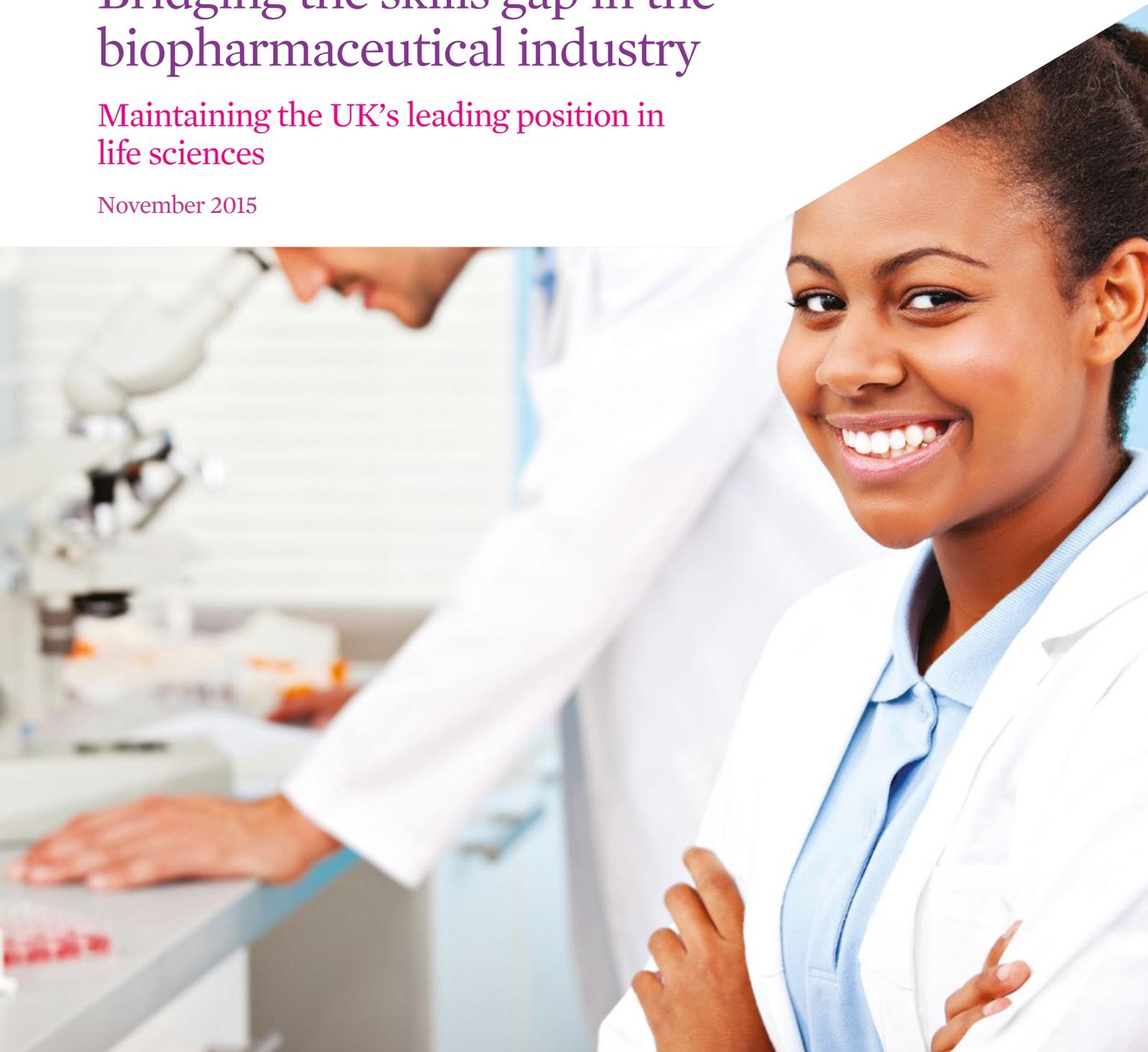
Executive Summary



Bridging the skills gap in the biopharmaceutical industry

Maintaining the UK's leading position in life sciences

November 2015



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Foreword



The UK has one of the strongest and most productive life sciences industries in the world, generating turnover of over £56 billion per annum. The pharmaceuticals sector alone accounts for more UK-based business R&D than any other manufacturing sector, accounting for over 22 per cent of all business R&D. There is significant opportunity to be grasped, with global health and life science markets predicted to grow up to 10 per cent per annum in the next decade.

Skills is an increasingly important part of the picture. Across the whole life science sector, over a quarter of employment involves highly skilled research and development roles and commands a wage premium. This is why this ABPI survey of current and future skills needs for the pharmaceuticals industry is so important. It highlights the need for skills in areas such as bioinformatics, statistics, data and informatics, many of which were not even highlighted as issues in 2008, the year ABPI last carried out this survey. At the same time it shows the continued importance of long-standing skills challenges including translational medicine and clinical pharmacology.

It is essential that the sector continues to have access to a highly skilled R&D, manufacturing and technical workforce in order to achieve its potential, maintain the UK's position at the forefront of life sciences and help to meet the challenge of addressing the productivity gap. This ABPI report will provide invaluable evidence for industry and policymakers to develop and deliver the right skills initiatives to ensure that the sector continues to thrive in the future.

A handwritten signature in black ink that reads "George Freeman." The signature is written in a cursive style and is positioned above a horizontal line.

George Freeman MP
Parliamentary Under Secretary of State for Life Sciences,
Department for Business, Innovation and Skills



1 Executive summary

‘The fundamental driver behind any innovation process is the human factor associated with it’¹

As the Government set out in *Fixing the Foundations*, weaknesses in the UK skills base have contributed to its long-standing productivity gap with peer nations, and ‘[i]t is imperative that the UK addresses these shortfalls if productivity is to improve.’² As a leading industry for growth and innovation in the UK, the biopharmaceutical industry agrees that developing an appropriate skills base is vital to maintain growth and investment in the UK. We are the most research-intensive business sector in the UK, spending over £4 billion on research and development in 2013. We are also a major contributor to the economy of the UK, bringing life-saving and life-enhancing medicines to patients. Our members supply 90 per cent of all medicines used by the NHS, and are researching and developing over two-thirds of the current medicines pipeline, ensuring that the UK remains at the forefront of helping patients prevent and overcome diseases. The skills required for research, development, manufacturing and commercialisation of medicines are often very specific, and are key to the ability of the industry to deliver innovative medicines to patients.

This report provides an up-to-date and robust view on the skills needed now and in the near future for the industry to thrive in the UK. Notably, it highlights **major skills gaps in mathematical and computational areas**, which have emerged due to the rapid development of new disciplines such as systems biology and health informatics. Other skills shortages are more long-standing, such as in **translational medicine/clinical pharmacology**, which requires complex understanding to bridge the gap between bench and bedside. We believe that this evidence will be invaluable to Government, the Science Industry Partnership (SIP), research funders and academia, to inform education and skills policy and investment, and to ensure the right skills base in the UK develops and thrives.

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The ABPI last reported the skills needs of the biopharmaceutical sector in 2008, following on from our 2005 report. Since 2008, both the industry itself and the science behind new medicines have gone through substantial changes. There have been a number of mergers of large companies, downsizing of UK research and development (R&D) activities and closure of some R&D sites. New medicines often arise following collaboration with academics or small to medium sized companies (SMEs) and, as a result of this, in the future the biopharmaceutical company may be less likely to be the discoverer of the drug molecule. An increasing proportion of new medicines are biologics³ rather than chemically-processed small molecule medicines, and new medicines are less likely to have been identified through high-throughput screening of banks of compounds and more likely to have been created following mining of data. The medicine may also only be intended for a small subgroup of patients, i.e. a stratified medicine⁴ which will be prescribed only after a diagnostic test has confirmed that the medicine is likely to be effective for that patient. These changes will have greatly influenced the skills required by the industry.

With this 2015 report, we benchmark the results of our recent survey, carried out to establish the current and future skills needs for the pharmaceutical industry, against those identified in 2008. Respondents were primarily from pharmaceutical companies and contract research organisations (CROs), with small numbers of respondents from small companies and other organisations. The skills areas identified as the highest priority for action, where over 50% of respondents said that immediate action was required to address difficulties in recruitment, are shown in the chart on page 6.

1 Cornell University, INSEAD, and the World Intellectual Property Organization (WIPO). (2014) *The Global Innovation Index 2014: The Human Factor in Innovation*. http://www.wipo.int/edocs/pubdocs/en/economics/gii/gii_2014.pdf

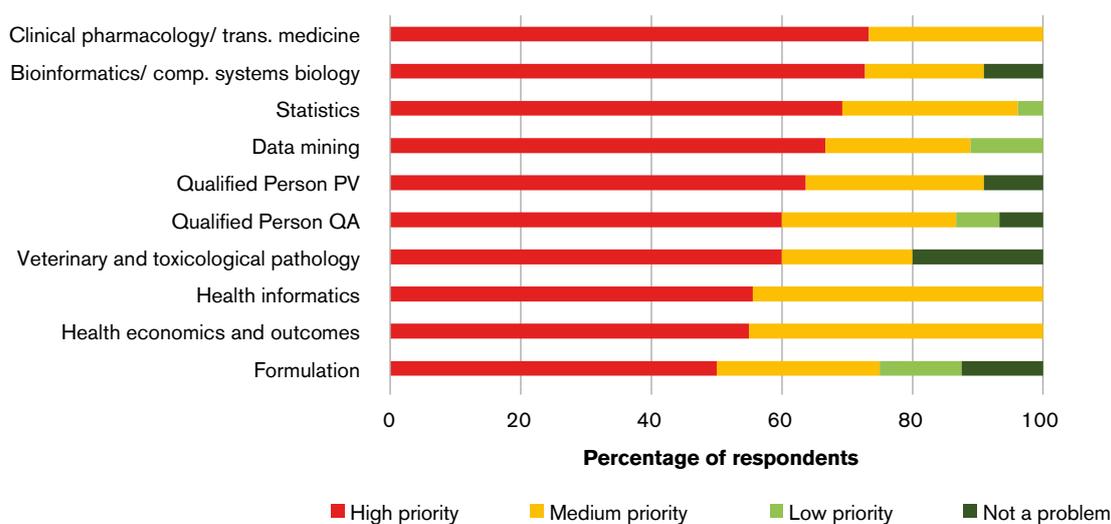
2 The Rt Hon George Osborne MP and The Rt Hon Sajid Javid MP. 2015. ‘Fixing the foundations: creating a more prosperous nation.’ London: HM Treasury, Department for Business, Innovation & Skills.

3 Biopharmaceuticals that need to be manufactured in cells.

4 For further details on stratified medicines (sometimes also referred to as precision or personalised medicines), please see 2014 ABPI report *The Stratification of Disease for Personalised Medicines*. <http://www.abpi.org.uk/our-work/library/medical-disease/Pages/100914.aspx>

Many of the areas of highest concern relate to mathematical and computational skills, including **bioinformatics, statistics, data mining, health informatics, and health economics and outcomes**. Many of these are new fields which were not even raised as future concerns in 2008. In contrast, other disciplines, such as clinical pharmacology/translational medicine and veterinary and toxicological pathology, are long-standing concerns which were previously highlighted by the ABPI.⁵ Other disciplines where the skills base is weak include **Qualified Persons**,⁶ and **pharmacy formulation**. Generally, the weaknesses relate to both the number and quality of applicants. Recruitment of experienced staff is a concern across all these areas but, for many, there are also issues with recruiting recently qualified graduates and/or PhD/ post-docs.

We have also identified some disciplines which, although not currently areas of high concern, are expected to become more difficult to recruit for in future. Notable amongst these are **device technology and materials science, physiological modelling and physical chemistry**. These areas should be taken into account when horizon scanning and defining education, training and professional development strategies for the future.



Highest priority concerns

Our research has also identified that **some of the top skills gaps in 2008 no longer feature** as areas of high concern, including bioscience areas such as drug metabolism and ADME, pharmacokinetics and pharmacodynamics, and *in vivo* sciences. This may in part be due to the changing landscape of the pharmaceutical industry, but is also likely due to a number of initiatives that were funded and taken forward in response to the ABPI findings. These included collaborative capacity-building activity involving both industry and other funders, such as the Integrative Mammalian Biology Centres funded by BBSRC, HEFCE, MRC, SFC, BPS Integrative Pharmacology Fund and BIS; and Advanced Accreditation of undergraduate bioscience degrees by the Royal Society of Biology. Our members conclude that these initiatives have been effective and it is essential that, as funding for some such initiatives approaches its end, activity in these areas continues to avoid recurrence of skills gaps in these areas.

Most core or transferable skills, such as problem solving and application of scientific knowledge, are now less of a concern than in 2008, with the **notable exception of communication and teamworking skills** which seem to be a growing concern for respondents.

⁵ Skills needs for biomedical research (2008) <http://www.abpi.org.uk/our-work/library/industry/Pages/skills-biomedical-research.aspx>

⁶ In quality assurance (QA) a Qualified Person is responsible for certifying batches of medicinal products prior to use in a clinical trial or release for sale. Under the European Pharmacovigilance (PV) regulations the QPPV is responsible for creating and maintaining the marketing authorisation holder's pharmacovigilance system which must fulfil the legal obligations regarding product safety.

Recommendations

Based on the findings reported here, we make the following recommendations to address both current and future skills needs for the pharmaceutical and biopharmaceutical industries, and ensure the continued viability of this important sector in the UK:

▶ The Science Industry Partnership (SIP) Board⁷ should review the evidence and consider action that could be taken through the SIP to address the skills concerns identified.

▶ In areas where evidence suggests that high level and professional skills are concerns across both industry and academia, action will be sought through the Research Councils and appropriate Professional Bodies.

▶ The pipeline for the development of appropriate mathematical skills must be considered. This extends from opportunities for students to study maths alongside science subjects post-16, through universities putting increased emphasis on maths in bioscience courses, to raising awareness and uptake by UK and EU graduates of Masters and PhD level training in statistics, data mining, mathematical modelling and related disciplines.

▶ ABPI Expert Network Groups,⁸ and the Medicines Manufacturing Industry Partnership (MMIP) Skills group⁹ (for manufacturing concerns), should monitor the critical disciplines in their area and raise concerns when it is becoming more difficult to recruit people with the skills required or when new needs are identified. The Expert Networks, through discussion with stakeholder organisations and the ABPI's Academic Liaison Expert Network, should also consider what action is required and how best it should be taken forward.



⁷ <http://www.scienceindustrypartnership.com/home/>

⁸ <http://www.abpi.org.uk/about-us/how-we-work/Pages/working-members.aspx>

⁹ <http://www.abpi.org.uk/our-work/mandi/Pages/manufacturing.aspx>

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