

Market overview

We live in a period of rapid expansion of biological knowledge. Daily breakthroughs are being made in mankind's understanding of how cells operate in health and disease.

These advances are possible because of rapid growth in understanding of the role of proteins expressed by genes. This understanding is in turn powered by the provision of high-quality research tools and reagents in support of hundreds of thousands of scientists around the globe.

Today, the global market for research antibodies and reagents that Abcam serves is worth approximately \$3bn¹ and growing at around 4% per annum¹. Within this figure primary antibodies contribute approximately \$1bn¹, with related research reagents including secondary antibodies, kits, assays, proteins, lysates and cell lines comprising the balance.

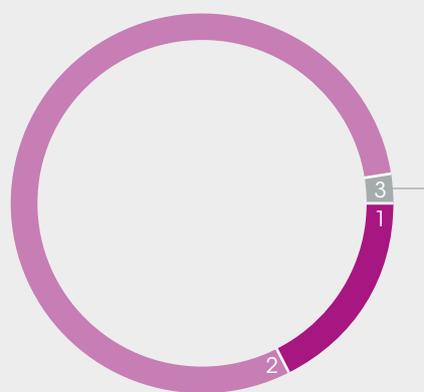
In recent years, in partnership with biopharmaceutical and diagnostic companies, Abcam has begun to extend the commercial application of its antibodies into diagnostic and therapeutic markets. According to market research, the global monoclonal antibody-based therapeutics market is expected to double in size from 2017-23 and reach over \$200bn. Similarly, the companion diagnostics market is forecast to expand rapidly, reaching some \$25bn by 2022.

Abcam serves this market through the development of high-performance antibodies for diagnostic and biopharmaceutical organisations that have the potential to be used in clinical products, including in-vitro diagnostics (IVD), companion diagnostics, immunoassays and biological therapeutics.

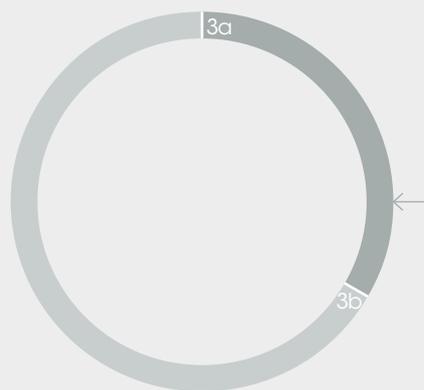
Market overview

Antibodies and associated life science research reagents have a broad range of commercial applications that exploit their ability to recognise and bind to specific targets, with three broad areas of use, as outlined in the table to the right.

Estimated global antibody markets (2018)



- 1 Diagnostics \$22bn
- 2 Therapeutics \$100bn
- 3 Research reagents \$3bn



- 3a Primary research antibodies ~\$1bn
- 3b Other research reagents ~\$2bn

¹ Source: Pivotal Scientific (2018).

	Proteomic research reagents	Diagnostics	Therapeutics
Products	Research reagents including primary and secondary antibodies, kits and assays, proteins, peptides, lysates, cell lines and biochemicals.	Monoclonal antibodies and immunoassays	Monoclonal antibodies
Description	<p>Antibodies and associated reagents are used to detect, quantify and modify proteins in scientific research experiments and thus enable conclusions to be drawn about the target molecule and pathway of interest. They are fundamental, irreplaceable tools for the work of life scientists.</p> <p>Regulatory approval of research-grade antibodies is not required.</p>	<p>Antibodies have become a critical component of many in vitro diagnostic (IVD) assays, including companion diagnostics. Uses include, but are not limited to, the detection of infections, recognition of allergies and the measurement of hormones, proteins and other markers in biological samples.</p> <p>Antibody diagnostics generally require regulatory approval.</p>	<p>Antibodies can be used as therapeutic agents for the treatment of diseases including certain cancers and immune-related diseases.</p> <p>Therapeutic antibodies require high levels of regulatory approval.</p>
Estimated addressable market size	~\$3bn ^{1,2}	~\$5bn ²	
Long-term estimated market growth trend	~4% ²	~5-8% ²	
End markets	<ul style="list-style-type: none"> - Academic labs located in universities, higher education and government research institutes. - Clinical labs in pharma and biotech companies working in the drug discovery and diagnostic markets. - Core facilities located in hospitals, research institutes, and other large organisations. 	Clinical labs in pharma and biotech companies working in the drug discovery and diagnostic markets.	
Abcam sales	Catalogue sales (RUO)	Custom Products and Licensing	
Competition	Although only a few players have significant global scale and liquidity, the marketplace for RUO antibody suppliers is fragmented and competitive, reflecting the wide range of technologies and applications that use these products and the unregulated status of the market.	<p>Companies in diagnostic and therapeutic-use markets include specialist diagnostic businesses, Contract Research Organisations (CROs) and in-house teams at biotechnology and biopharmaceutical firms, who may outsource antibody design and discovery when reaching capacity or when they encounter a problem that requires outside expertise.</p> <p>We have built a significant network of collaborations across this landscape and are working on many bespoke projects in partnership with large biopharma and diagnostic companies to develop antibodies for these markets.</p>	

1 Source: Pivotal Scientific, internal company estimates.

2 Source: Market research, internal company estimates.

Major trends in our markets

Major drivers of growth and change in our markets include:

Increased funding for biomedical research



Life science research funding continues to grow in many countries around the world, driven by increased investment into biomedical research from a combination of government, industry and private capital. Increased investment is funding translational research programmes associated with the development of next-generation therapies including immuno-oncology and immuno-therapy, treatments for chronic diseases associated with ageing populations, as well as rare and genetic diseases and the ongoing threat from infectious diseases such as HIV/AIDS, malaria and Ebola virus.

The increase in funding for industry-academia collaborations seen in recent years is expected to continue. Examples include the NIH's BRAIN Initiative, Cancer Moonshot and the Precision Medicine Initiatives in the US and China.

Implications for Abcam

Increased funding for life science research serves to expand the number of projects undertaken, researchers employed and experiments conducted, increasing the requirement for Abcam's products. In particular, a large percentage of Abcam's revenues are derived from consumers who are publicly funded through research grants. The nature of the market means that it is difficult to give a precise measure, but it is thought to be somewhere around 70% of our revenue. Our remaining consumers are spread across the pharmaceutical, biotechnology and in-vitro diagnostic markets.

Abcam's approach is to seek to understand and anticipate the evolving research and development (R&D) funding landscape across different regions and research areas in order that we can provide the most effective solutions and best serve consumer needs.

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Growing significance of genomic and proteomic research



As technological innovation has driven a dramatic reduction in the cost of gene sequencing in recent years, its use has rapidly expanded, resulting in a commensurate increase in the identification of possible genetic targets and biomarkers for disease diagnosis. This has led to a proliferation in proteomic research in areas spanning stem cell research, gene editing, epigenetics, neuroscience and cancer.

All types of proteomics research are benefiting from this phenomenon, including protein separation, protein identification, protein quantification, protein sequence analysis, structural proteomics, interaction proteomics, protein modification and cellular proteomics.

At the same time, the market is also benefiting from increasing penetration of technologies enabling comprehensive and faster analysis of proteins, such as high-throughput immunoassay instruments. These developments are enabling scientists to increase productivity and achieve results faster, by processing hundreds of biological samples simultaneously.

Implications for Abcam

Abcam provides tools that are fundamental for proteomic research. A greater focus on research into protein function, together with an increased use of high-throughput platforms which require large volumes of reagents, is therefore linked to increasing demand for these products.

As our markets continue to innovate and change we constantly review opportunities to augment our existing products and services that will support the needs of our customers.

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Structural growth in R&D investment in China



The Chinese government has placed scientific and technological innovation at the centre of the long-term socio-economic development of the country and is supporting this major initiative through funding, reform and societal status.

China now ranks second in the world in number of scientific papers produced and is the world's second-most-cited source, behind the US. In 2019, the Chinese government said it has begun formulating its science plans for 2021 to 2035 and intends to step up its basic research efforts, enhance innovative capabilities, increase international cooperation and improve its supervision and regulation.

China increased spending on R&D by 11.6% in 2018 to \$291bn or 2.18% of GDP, up from 1.14% in 2005 and is on track to reach its 2020 target of 2.5% a year early (Source: National Bureau of Statistics).

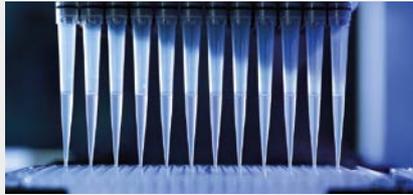
Implications for Abcam

The Chinese market contributed over 16% of Abcam's catalogue sales in 2018/19, up from c.5% in 2013 and represents a significant long-term growth opportunity. Our expectation is that the Chinese market has the potential to be as large as the US for our business in the next 15 years and we are building up our capabilities in the country to reflect this.

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Focus on research reproducibility and reagent quality



Antibodies have a vital role in biomedical research and across the industry there are calls for greater reproducibility of data in primary publications. Unreliable research reagents lead to wasted time and money, with one survey from Nature reporting that more than 70% of researchers have tried and failed to reproduce another scientist's experiments, and more than half have failed to reproduce their own experiments.

High-quality research antibodies, providing high specificity, sensitivity and consistency, are needed to make critical progress on this issue – helping to increase confidence in research outcomes and reduce waste across the industry.

Implications for Abcam

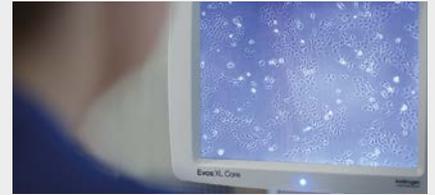
As a leading provider of antibodies and research reagents, Abcam's ability to provide scientists around the globe with products they can trust, that are of the highest integrity, along with the data needed to support and validate their research is vital to our continued success.

Our investment in innovative antibody manufacturing techniques, such as recombinant-based engineering, and powerful cell editing tools, such as CRISPR, are helping us to pioneer antibody quality and validation techniques and speed up the accuracy and pace of research.

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Precision medicine and protein therapeutics



High unmet needs in the effective diagnosis and treatment of cancer and other diseases is driving demand for protein therapeutics and personalised medicines across the medical community.

By tailoring therapies to patients based on a particular genetic condition or the mutation profile of their cancer, patients are able to benefit from better outcomes whilst healthcare costs are reduced by preventing the prescription of costly, yet unnecessary, treatments. Antibody-based companion diagnostic tests are one way of identifying patients most suited to a treatment.

Similarly, the use of targeted monoclonal antibody treatments has been shown to have greater efficacy and precision than traditional chemo- and radio-therapies, reducing patient side effects. To date, just over 100 MABs have been approved for therapeutic use by the US FDA, with many more in clinical trials.

Implications for Abcam

Abcam's strong capabilities in the design and manufacture of the highest quality recombinant monoclonal antibodies is helping us build a reputation as an effective partner for biopharmaceutical, diagnostic and instrument companies.

We are working with many companies across the industry to develop antibodies and immunoassays that they will take to market for diagnostic and therapeutic applications.

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How we create sustainable value for stakeholders over the long term

Inputs

The resources and relationships we need to run our business and create long-term value:

Our people

Our people are fundamental to our continued success. Their skill and dedication enable us to fulfil our purpose. We aim to create a safe, fair and high-quality working environment. We invest in the development of our employees and encourage the sharing of feedback and ideas. We actively promote our culture, which focuses on earning the trust of all our stakeholders.

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Our data and data analytics

We analyse and interpret significant amounts of data in order to better understand what customers need. We use the insights gained to inform our product development pipeline in support of their research goals.

Research and development

We have leading antibody discovery, innovation and manufacturing capabilities that allow us to develop unique, reliable products and technologies which meet customer needs. We are investing in our R&D capabilities in adjacent life science reagents where doing so will also strengthen our antibody development capabilities, for example in recombinant proteins, cell lines and lysates, and imaging and multiplexing consumables.

Our global footprint

We sell our products in over 140 countries through a variety of channels. Our global distribution network means that in most cases customers can have the product they need working in their lab within 48 hours of ordering. Our multilingual scientific support teams are on hand to help customers around the world with technical queries.

Our partners

We work with partners, including third-party suppliers who provide us with products, as well as distributors and industry partners who support the sale of our product portfolio. We are transparent about how we work in terms of ethics, quality, the environment and general business principles, and aim to build long-term collaborative relationships based on trust.

Our financial resources

We have an attractive financial profile and generate significant free cash flow. As a public listed company, we have access to capital through our shareholder base. We also have access to sources of third-party funding and capital through our relationships with banks and other financial institutions, including our £200m RCF facility.

How we create and capture value

From Abcam's inception, we have increased the value of our products by adding performance data that is readily accessible to our consumers.



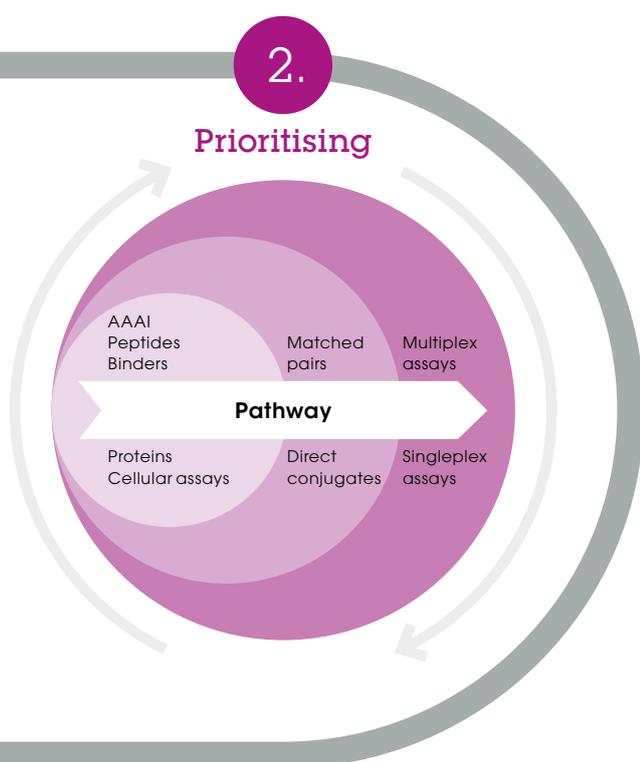
1. Gain insights into how our customers work and what they need

We maintain regular dialogue with key opinion leaders at industry events, conduct consumer surveys and focus groups and are continuously interacting with consumers through our scientific support teams and other customer touch points. This allows us to keep up with market and research trends and gain insights into our customers in both academia and industry. In addition to these opportunities to listen, we make extensive use of the data analytics from our website and other data sources to uncover unmet needs, and then apply these learnings, as appropriate, to our product development pipeline.

2. Prioritise high-value pathways and targets, tailor and extend product portfolio

We focus on the areas of greatest technical and commercial need and then innovate. This starts with an understanding of which biological pathways and research targets are most important to researchers. Once we have identified a consumer need, we use our portfolio of leading antibody and immunoassay technologies to create unique, effective solutions. We also offer a range of complementary products that are related to these pathways and targets. As we add more data, we add more value to the products and give researchers confidence that the products will work first time and every time.

We are now expanding how we add value by increasing the feedback mechanisms for consumers, acting on these insights and providing products for difficult targets.



3. Quickly offer what consumers need through digital and offline channels

Our digital platform plus our offline channels provide customers with what they want faster, wherever they are, and in the format they prefer. We continue to focus on ways to improve the ease and efficiency with which consumers are able to find and access the products and services they need. In addition to our digital channels, we have an extensive range of offline channels: Abcam-hosted conferences, other conferences we attend, our field sales teams, and our global customer and technical support teams.

4. Learning

We constantly learn from our consumer interactions and improve our offering as a result.

Broadening our offering

We continuously review opportunities to expand our offering to consumers by broadening our product range, improving speed to market and accessing underpenetrated consumer groups in the markets we serve.

Outputs

Generating long-term value for our stakeholders:

Our customers

Our portfolio of leading-edge antibody technologies, comprehensive consumer insights, personalised support, data, and continually growing range of high-quality research reagents help researchers around the world accelerate scientific discovery in the laboratory and apply those discoveries in the clinic.

Our people

Essential to our success is listening to our employees and recognising their achievements. Our people remain highly motivated by the opportunities we provide to gain additional skills and experience and to help advance their careers at Abcam.

Our shareholders

Operating transparently and responsibly, we regularly engage with our investors. We manage our business to generate attractive and sustainable long-term economic returns.

Our partners

Our product suppliers benefit from our global distribution network, digital platform and recognised brand to support the sales of their products. Our industry partners receive access to our products and technologies, supporting the development of antibodies and immunoassays that they are able to take to market for diagnostic and therapeutic use.

Our communities

We support a range of local initiatives and work with organisations to share best practice and knowledge in our sector. We support young people with employment opportunities, internships and work experience where possible.

Our society

Through the provision of high-quality research reagents we are supporting progress of the identification of biomarkers for disease diagnosis, disease-causing genes and drug interaction pathways, aiding the development and accurate prescription of the effective treatments for disease as well as reducing waste in research.

In addition, we create socio-economic benefits for a range of stakeholders including generating income for governments through our tax payments and providing employment across our supply chain and in the communities where we operate. In 2018/19 we paid Income taxes of £13.5m.

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