

Creating value & underpinning resilience

Making the UK one of the best
places to manufacture medicines

UK Research and Innovation (UKRI) is the largest public funder of research and innovation in the UK, with a budget of over £8bn. It is composed of seven disciplinary research councils, Innovate UK and Research England. We operate across the whole country and work with our many partners in higher education, research organisations businesses, government, and charities. Our vision is for an outstanding research and innovation system in the UK that gives everyone the opportunity to contribute and to benefit, enriching lives locally, nationally and internationally. Our mission is to convene, catalyse and invest in close collaboration with others to build a thriving, inclusive research and innovation system that connects discovery to prosperity and public good.



KTN exists to connect innovators with new partners and new opportunities beyond their existing thinking – accelerating ambitious ideas into real-world solutions. Our diverse connections span business, government, funders, research and the third sector. With 200 staff across the UK, deep technical sector expertise, and over 43,000 organisations in the network, KTN drives opportunities for societal and economic change through convening communities of innovation. KTN works in partnership with Innovate UK and UKRI to support UK innovation, and has amplified the value and impact of the Medicines Manufacturing Challenge through the delivery of a portfolio of activities at regional and national level.



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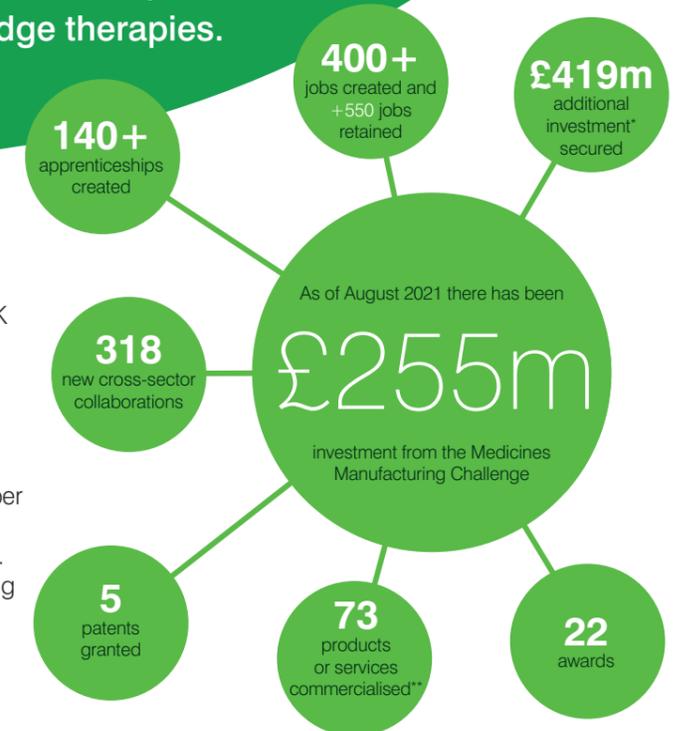
Meeting the challenge

The Medicines Manufacturing Challenge was established in 2017 to support and grow the UK's capabilities in manufacturing medicines. As of July 2021, £255 million has been invested in developing first-of-a-kind technologies to manufacture medicines and accelerate patient access to new drugs and treatments, firmly establishing the UK as a leading global hub for the development, production and delivery of cutting-edge therapies.

UKRI investment in the Medicines Manufacturing Challenge has driven innovation in medicines manufacturing, de-risked development of new technologies, supported infrastructure and embedded a culture of collaboration and fresh ideas across the UK life sciences landscape. It has also helped to establish the skills and capabilities required to deliver the next generation of therapies through training opportunities and apprenticeships.

Over the coming years there will be an increasing number of life-changing advanced medicines such as cell and gene and nucleic acid therapeutics becoming available. Continuing to support the UK's medicines manufacturing and delivery capabilities, will ensure patient benefit, economic growth and will further establish the UK as world leaders in science and technology.

Nowhere has the impact of investment in medicines manufacturing been more obvious than in the delivery of vaccines in response to the COVID-19 pandemic. By bringing together key stakeholders across the UK life sciences ecosystem and supporting the rapid ramp-up of vaccine manufacturing facilities, the sector was able to deliver millions of doses of the UK-developed Oxford AstraZeneca vaccine for use at home and abroad, helping to secure global health.



Continuing to invest in the UK's transforming medicines manufacturing capabilities will put us at the forefront of life-changing medical advances and enable us to be as prepared as possible for what's to come.

'Innovate UK recognises that investing in medicines manufacturing makes the UK an attractive place to start and grow innovative healthcare businesses, drawing inward investment from around the world, whilst delivering much needed health benefits.'

Indro Mukerjee, Chief Executive, Innovate UK

'Through these investments the UK is developing, derisking and deploying highly innovative flexible, agile and scalable technologies that will drive the growth of this critically important manufacturing sector.'

Sarah Goulding, Medicines Manufacturing Challenge Director, Innovate UK

Investing in global Britain

Over the last five years, the Medicines Manufacturing Challenge has played its part in growing the UK's medicines manufacturing sector into an industrial powerhouse that will bring economic and health benefits to future generations. By building on this strong foundation, we can make the UK a central player in an expanding, multi-billion pound global industry.

When we invest in innovative businesses, investors follow

The medicines manufacturing industry is growing fast, and the UK has the opportunity to capture that growth. When the Medicines Manufacturing Challenge launched, we aimed to attract co-investments of £157 million from industry in our first 10 years. Four years later, we've already attracted £419 million*.

In Glasgow, the Medicines Manufacturing Innovation Centre has secured £13 million in industry funding and is negotiating further investment. And our capital investment competitions have seen four of our grant awardees growing their collective turnover. The Advanced Therapy Treatment Centre (ATTC) network now has 6% of global Advanced Therapy Medicinal Product clinical trials run through its centres, and the network co-ordinates with 64 partners in industry, academia and healthcare providers.



'Small grants early on helped us become established as a clinical entity, and enabled us to start tackling the unique and bespoke nature of cell and gene therapy.'

Christopher Vann, Senior Vice President, Chief Operating Officer at Autolus

These successes clearly demonstrate the potential of medicines manufacturing to generate investment in the UK, and it's a strong base on which to build for future economic growth.

Our unique ecosystem attracts global businesses

The UK's life sciences ecosystem enables Government, industry, and academia to work together to advance knowledge and build manufacturing capacity. Infrastructure investment through the Medicines Manufacturing Challenge has enabled companies to find not just financial support, but a wealth of expertise and knowledge (see page 8), along with physical space to develop and test new ideas.

This unique offer is why Autolus - a company housed in the Cell and Gene Therapy Manufacturing Centre in its early years - has chosen the UK as its long-term home over a potential site in the USA. And it's why TCR2 Therapeutics became the first US company to choose the same centre as its UK base.

Investing in medicines manufacturing is investing in our population

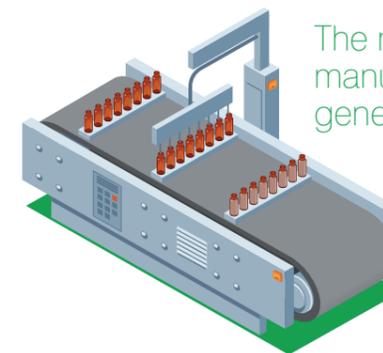
The UK's swift COVID-19 vaccine rollout was greatly aided by the investments we've made in medicines manufacturing in recent years (see page 12). By facilitating vaccine production in the UK, we are not only boosting our economy, but most importantly protecting global health by getting vaccines to those who need them both locally and around the world.

Furthermore, our experience during COVID-19 has shown the power of domestic manufacturing capabilities. If we act now, the UK can become a world-leading site for producing the next generation of advanced therapies, such as CAR-T cells and nucleic acid therapeutics, building our health resilience, and providing a pipeline of skilled, long-term jobs.

The medicines market is growing

The medicines manufacturing sector generates around £10 billion for the UK economy each year, while the global market for pharmaceutical manufacturing is predicted to reach \$673 billion by 2027. The advanced therapies industry as a whole is projected to grow to £14 billion by 2025. If we seize the opportunity to build on our successes, we can become a powerhouse of medicines manufacturing that attracts more business from across the world.

We must also remain a global and collaborative player. Science works best when we share and learn from each other. By providing challenge-led funding for transforming medicines manufacturing, we incentivise businesses to work with partners with different skill sets to innovate unique solutions to manufacturing problems.



The medicines manufacturing sector generates around

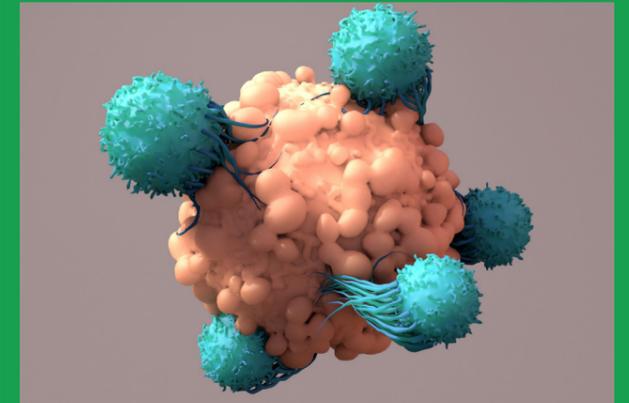
£10 billion

each year for the UK economy

Our future health relies on early investment

Future pandemics are a certainty, and innovation in new therapies will create life-changing treatments for debilitating diseases. As a result, medicines manufacturing will continue to be an essential and growing sector in the UK and global economies. If we continue to invest in medicines manufacturing today, we'll be better prepared for the health challenges of the next five years and beyond.

CASE STUDY



Autolus: From spin out to a potential billion dollar business

Autolus makes personalised cancer treatments known as CAR-T cell therapies. These are created by harvesting a patient's own immune cells, modifying them, before returning them to the patient where they locate and destroy tumours. Many cancer patients who receive the treatment go into remission.

Since founding in 2014 as a spin out from UCL, Autolus has received £7.4 million in funding from Innovate UK and has received investment of approximately £500 million. It became a publicly listed company on Nasdaq in 2018. The company has created over 300 jobs with further expansion currently ongoing at its Stevenage facility.

Medicines Manufacturing Challenge funding was important to Autolus' growth. Obtaining development and manufacturing space in Stevenage allowed the company to focus on developing innovative manufacturing approaches, alongside running proof-of-concept trials. And once Autolus had invested in upskilling their UK workforce, they were incentivised to keep their business in the country.

Without Medicines Manufacturing Challenge support, Autolus' growth would have been slower, and would likely have been placed outside of the UK. Instead, it has created jobs, investment and potential revenue of £1 billion per year once the Company's lead products are commercialised.

Strengthening UK infrastructure

The UK has a unique medicines manufacturing ecosystem that fosters innovation and collaboration between academia, industry and Government. Our infrastructure investments put development and manufacturing side by side, creating a setting where researchers can generate great new ideas and businesses can upscale them for financial success and patient benefit.



Less risk, more opportunity

Economic pressures have pushed the pharmaceutical industry to drive new ideas in drug discovery, but less so in manufacturing where the financial risks of changing existing processes are high. The Medicines Manufacturing Challenge has started to redress this imbalance by investing in ways to de-risk innovation in medicines manufacturing.

By providing early-stage funding, we have created an environment where companies can explore novel manufacturing technologies and select from the best and brightest ideas. We then provide the further investment needed to scale up these new methods and bring them quickly to the clinic. One example is Arcinova, a Quotient Sciences business, who have commercialised an award winning method for continuous manufacturing, Flowinova, which was developed in partnership with the University of Nottingham and supported with £1.5 million of Medicines Manufacturing Challenge funding. It offers greater control over production volume, allowing companies to scale-up and down more easily to meet patient demand and reduce waste.

A connected innovation community

By establishing a connected Challenge Community (see page 14) companies can explore innovative ideas in a low-risk environment, we can find new ways to solve production challenges and build the UK's reputation as a fast, reliable manufacturing centre for the global medicines industry.

Collaboration is key to success

The close working relationships fostered by the Medicines Manufacturing Challenge between academia, industry and Government have helped to create a regulatory environment that enables progress to happen faster, which was essential when adapting existing facilities to produce approved COVID-19 vaccines.

We also encourage new collaborations between businesses with unique skillsets, with the goal of solving complex manufacturing challenges. For example, our challenge awardees CPI, Ipsen and SME Touchlight worked jointly to develop improved cell-free expression technology – a method of producing proteins for use in therapeutics. The project brought together state-of-the-art manufacturing capability with technical expertise and innovative thinking. Numerous scientific and technical challenges were overcome through cross company collaboration resulting in successful demonstration of the technology.

Ready and resilient

Our connected medicines manufacturing infrastructure enabled a rapid response to the COVID-19 pandemic (see page 12), but it is also the key to treating many other diseases in the future.

We must continue to build not only our vaccine manufacturing capabilities to protect the nation in the face of future outbreaks, but also support the production of innovative cell and gene therapies. Right now, we can't make these kinds of therapies as quickly or at the scale that we need to deliver for the whole population, so we must continue to develop the UK's advanced therapy manufacturing infrastructure.

The Medicines Manufacturing Challenge's £12 million investment to expand the capacity of the Cell and Gene Therapy Catapult Manufacturing Centre is allowing more businesses to develop cell therapies within the UK as well as the ability to quickly pivot to different products depending on need, such as in a disease outbreak situation. By anchoring advanced therapy companies like Autolus here (see page 5), we will help improve early access to novel medicines and minimise delays and shortages for UK patients.

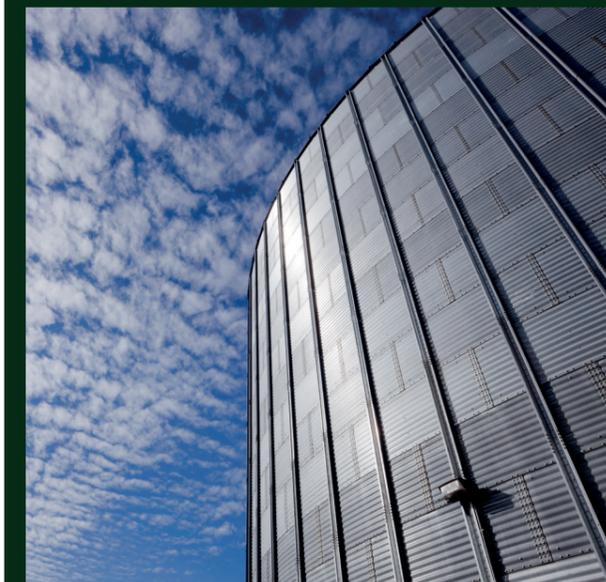
Building a sustainable future

The pharmaceutical industry is a significant contributor to climate change, with greenhouse gas emissions having increased over recent years, due to growing demand for, and production of medicines worldwide. Manufacture of medicines is traditionally driven by quality and safety factors, ensuring products reach patients in an uncontaminated condition. Use of disposable technologies has created a reliance on single use plastics in manufacturing process, and in product packaging.

To change this, the Medicines Manufacturing Challenge and KTN are working hand in hand with industry partners who are committed to sustainability – such as AstraZeneca and COP26 Principal Partner GSK - to make the sector more sustainable and reduce its environmental impact.

The UK has committed to the UN's 2030 sustainable development goal of sustainable industrialisation. By offering early investment to companies working to increase efficiency and sustainability in medicines manufacturing, such as SageTech, we can create incentives for innovations that take us towards a greener future.

CASE STUDY



SageTech: Recycling anaesthetics to reduce carbon emissions

SageTech was founded in 2015 with the goal of reducing the cost and environmental impact of inhaled anaesthetics.

Inhaled anaesthetics are essential in modern surgery, but patients in the operating theatre take up less than 5% of the anaesthetic they breathe in. The rest goes into the atmosphere, adding up to the equivalent of around 3 million tonnes of CO2 every year - the equivalent of powering half a million homes for a year.

SageTech has developed patented technology that captures, extracts and purifies inhaled anaesthetics so they can be recycled and reused. The ultimate goal is to extract the captured waste volatile and purify it to meet MHRA standards, so producing a volatile drug that can be clinically reused to anaesthetise patients.

In 2018, SageTech, in collaboration with the University of Exeter Medical School, received funding through Innovate UK to help commercialise their technology, developing a waste anaesthetic collection programme across NHS hospitals and creating a commercial-scale purification plant. Their work is now attracting further investment, with a recent funding round raising £2.9 million in private investment that will help further scale-up and commercialisation.

Building skills

The key to the UK's future as a global medicines manufacturing hub is its people. The Medicines Manufacturing Challenge has laid the groundwork for building this highly skilled workforce, but we need to continue to nurture the pipeline for the next generation of scientists, engineers and technicians to maintain a thriving industry.

Investing in medicines manufacturing is investing in people

To become the global leader in medicines manufacturing we need to train our workforce now, and ensure we have a pipeline of skilled innovators to sustain the industry. The BioIndustry Association (BIA) has reported a 40k shortfall of new workers within the UK science industry - a shortfall that we are aiming to fill with skilled roles that offer a great return on investment.

'The UK will only be able to get ahead of international rivals if we build a diverse and rich skills base that can run these facilities for generations.'

Steve Bates, BioIndustry Association

New therapies mean new skills and jobs

As the UK's cell and gene therapy industry moves towards commercialisation of novel treatments, we will see an increasing need for a broad range of skilled technical, operational and clinical roles to support manufacturing scale-up and the adoption of these groundbreaking treatments within the healthcare system.

In response to industry need, the Medicines Manufacturing Challenge has invested in companies that are building the scientific and technical workforce in the UK to realise this promise. We've already made great progress, with our Advanced Therapies Treatment Centres (ATTCs) upskilling clinical staff in hospitals across the country to deliver new cell and gene therapies to the patients who need them.

Growing the medicines manufacturing sector within the UK also brings wider opportunities and jobs to local areas. For example, five firms that received capital funds through our investment competitions have created over 400 jobs between them. And companies located within the Cell and Gene Therapy Manufacturing Centre in Stevenage rely on regional supply chains, further boosting the local economy.

Apprenticeships to support sector skills

The Advanced Therapies Apprenticeship Community (ATAC) - funded through UKRI, supported by industry and coordinated by the Cell and Gene Therapy (CGT) Catapult - is growing the next generation of skilled workers to develop and deliver life-changing treatments. ATAC offers people at any stage of their career a way of working towards a recognised qualification, while gaining practical on-the-job skills and earning a salary. The ATAC programmes also offer a range of development opportunities and qualifications, such as degree apprenticeships allowing participants to gain a university-level qualification alongside their work.

The apprenticeship programme has been vital for addressing the skill shortage, while helping people build a sustainable career in the industry. More than 140 apprentices have been employed by companies including Oxford Biomedica, NHS Blood and Transplant, Autolus and GSK, exceeding the initial target of 100.

By building on this upskilling groundwork, the UK has the opportunity to develop the best people with the brightest ideas. In turn, this will attract businesses seeking to grow while developing an exciting career in a field with long-term potential. Furthermore, these skills are transferable to growing industries such as vaccines manufacture and biopharma.



'My apprenticeship has been an incredible opportunity to contribute to the next generation of medicines as I've been able to participate in the manufacture of a COVID-19 vaccine, as well as other products that are currently in clinical trials around the world.'

Emilia Reyes Pabon, Apprentice Technician Scientist, Clinical Biomanufacturing Facility, University of Oxford

From bright ideas to patient benefits

Ultimately, investment in medicines manufacturing brings benefits to patients. By encouraging innovation, on-shoring manufacturing and deployment capability, and upskilling clinical teams within the NHS, we are better placed to provide the best therapies for those who need them and build health resilience for the future.

In recent years we've seen significant breakthroughs in cell and gene therapies, which are designed to help our bodies heal themselves. Not only do these innovative treatments require new technologies and manufacturing processes to bring them to market, we also need to upskill clinical staff in order to deliver them.

Advanced therapies must be stored and delivered in very precise ways to ensure their effectiveness. That's why the Medicines Manufacturing Challenge has invested £27 million into developing three Advanced Therapy Treatment Centres (ATTCs) based within NHS hospitals across the UK.

These Centres enable clinical staff, including nurses and pharmacists, in NHS Trusts to work together with pharmaceutical companies and academic researchers, building capacity and skills to deliver cell and gene therapies to a growing number of patients. As a result, people are already being treated with life-changing new therapies through our ATTC Network and the number of trials is increasing year on year, enabling greater access to innovative medicines for patients in the UK.

We have also contributed to the development of the NHS Readiness Toolkit and e-learning resources to provide healthcare professionals and institutions with the knowledge and skills they need to deliver the next generation of treatments. If we can support advanced therapy operations within the NHS alongside our other manufacturing investments, we could have the capacity to produce and deploy lifesaving treatments for everyone in the UK who needs them within the next two decades.

CASE STUDY



Increasing access to experimental medicines through collaboration

The Innovate Manchester Advanced Therapy Centre Hub (iMATCH) is a consortium made up of The Christie and Manchester University NHS Foundation Trusts, the University of Manchester and nine commercial partners, focused on scaling up the development and delivery of advanced therapies.

The Christie has partnered with GSK to trial a new cell therapy for certain types of cancer, which involves genetically modifying patients' immune cells so that they can seek out and destroy tumours. Patients were recruited to the study through the Christie Hospital in May 2020 and by November the first patient received their modified cells. iMATCH supported the infrastructure required to make this cutting-edge clinical trial happen.

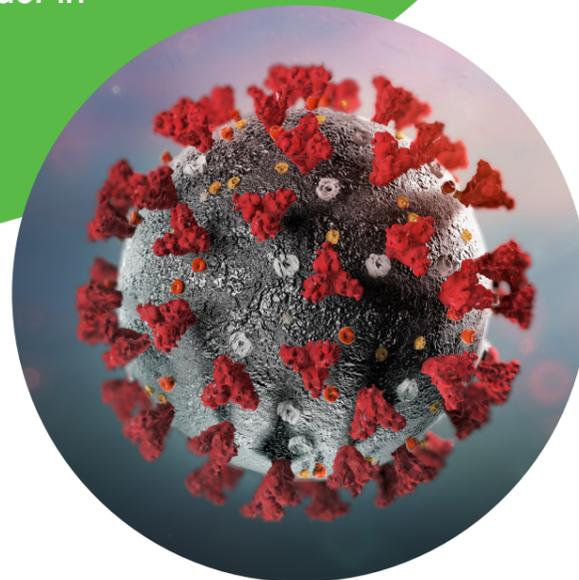
There are multiple benefits from this kind of collaboration. Industry partners have access to a location for trials and patients who want to take part, while NHS hospitals benefit from infrastructure development and staff training readying them to deliver advanced therapies as they become more widely available. Importantly, patients gain early access to experimental therapies and the infrastructure and skills being put in place mean that the wider population will be able to benefit from advanced therapies in the future.

'Thanks to the groundwork laid by the Medicines Manufacturing Challenge, we are now offering lifechanging therapies to many more patients.'

Fiona Thistlethwaite, The Christie NIHR CRF Director and Medical Oncology Consultant, iMATCH Director

An agile response to COVID-19

The COVID-19 pandemic has had a major impact on health and the economy here in the UK and around the world. Vaccines are a major part of the route to recovery, and early investment in cutting-edge technologies and manufacturing has enabled the UK to become a global leader in the vaccine rollout.



Late in 2019, the world was hit by the worst pandemic in living memory. As day-to-day life began to lock down and international travel was all but halted, it became clear that the only way back to near-normality would be a mass global vaccine rollout.

By the middle of June 2020, three COVID-19 candidates were ahead of the pack: the Oxford AstraZeneca vaccine, developed in the UK, along with mRNA vaccines from Pfizer and Moderna.

A connected ecosystem acting at speed

Our integrated medicines manufacturing ecosystem enabled a nimble response to the challenge of manufacturing new vaccines at speed during the crisis. The Vaccines Manufacturing Innovation Centre (VMIC), although not yet physically completed, was able to support establishment of the clinical supply chain for the Oxford vaccine using their in-depth understanding of existing networks and infrastructure. This collaboration helped underpin the rapid clinical evaluation of the new vaccine.

Further to this a partnership between VMIC and the advanced therapy manufacturers Oxford Biomedica allowed them to quickly establish vaccine production in their existing regulatory-compliant manufacturing facilities. Oxford Biomedica subsequently signed a deal with AstraZeneca worth more than £100 million to manufacture the vaccine, securing vaccine supply for the UK population and beyond.

Early investment pays off

The seeds of this success were sown back in 2017, when the Medicines Manufacturing Challenge awarded £5.6 million to Oxford Biomedica and Cobra Biologics to advance the UK's ability to produce viral vectors, as used in the Oxford AstraZeneca vaccine. This early investment undoubtedly helped underpin the fastest vaccine rollout in Europe.

We can draw a direct line from this early investment in the UK's viral vector manufacturing capability to protecting our citizens and growing the economy.

Protection for the future

The UK's rapid and successful vaccine response to COVID-19 has highlighted the value of previous investment into technologies and manufacturing that were used for vaccine production. We must now build on this foundation to ensure we are ready for the next outbreak.

We have benefited from a rich and collaborative resource of medicines research and manufacturing expertise, enabling a swift and assured response to the pandemic. We worked with the medicines manufacturing sector and the UK Vaccine Task Force to establish the supply chains and processes that would be required to deliver millions of doses of COVID vaccines, ramping up new manufacturing facilities and repurposing existing ones.

By continuing to invest in manufacturing skills and facilities, we will maintain and grow our capacity to rapidly produce a range of different types of vaccines at scale for national deployment or international export, securing future health resilience against the threats that are yet to come..

Closer to the patient

We also have the opportunity now to invest more into fill-finish processes, which prepare and package vaccines for deployment. Increasing our capacity not only for manufacturing vaccines but also packaging them efficiently and sustainably is essential for future pandemic responses.

Work on vaccine formulations is equally vital. One of the major barriers to a rapid worldwide COVID-19 vaccine rollout is the need to ship and store the vaccines at low temperatures and deliver them via injection. Alternative formulations, such as room temperature-stable vaccines or oral tablets would be easier to make, store and deliver, especially in low- and middle-income countries.

Fill-finish and formulation challenges are difficult to solve and solutions often fail, meaning that industry is less incentivised to innovate in this area. That's why initiatives like the Medicines Manufacturing Challenge are so important, facilitating manufacturing breakthroughs and filling a space that the market won't fill on its own.

'We had three goals during the pandemic: to get vaccines ready as quickly as possible, to support the global pandemic effort, and to create a legacy that made us better prepared for future. Our unique ecosystem meant we had the capability to achieve our goals.'

Ian McCubbin, The Vaccine Taskforce Manufacturing Lead, and Industry Advisory Group Chair for the Medicines Manufacturing Challenge

£5.6m

awarded to Oxford Biomedica and Cobra Biologics in 2017



CASE STUDY



Oxford Biomedica: Rising to the COVID-19 vaccine challenge

Founded as a spin out from the University of Oxford in 1995, Oxford Biomedica was the first commercial manufacturer of viral vector-based vaccines and therapeutics in the UK. Today, the company is split across several locations in Oxfordshire and employs more than 670 people. Throughout its growth, Oxford Biomedica has benefited from capital funding through the Medicines Manufacturing Challenge to expand its manufacturing facilities. This has attracted further investment through the public markets, enabling the building of Oxbox, a manufacturing site in Oxford that was opened by the Prime Minister Boris Johnson in January 2021 and has become integral to the UK's COVID-19 response.

The established manufacturing capability at Oxford Biomedica meant that it was well positioned to take on production of the viral vector-based Oxford AstraZeneca vaccine. With a boost of support through a collaboration with VMIC towards manufacturing equipment for the expanded facilities, the company was able to secure a five-year deal with AstraZeneca to produce millions of litres of the vaccine. These vaccines have since been used to protect nearly a third of the UK population, helping to bring us back to normality.

Connecting for Change

KTN accelerates the outcomes of the Challenge through their 'Medicines Manufacturing Challenge Community'.

KTN exists to connect innovators with new partners and new opportunities – accelerating ambitious ideas from challenges - such as Medicines Manufacturing - into the solutions that benefit our economy and society.

Central to this work is people and collaboration, recognising that groups of diverse innovators, such as the Medicines Manufacturing Challenge Community, can achieve far greater together than as individuals. These communities enable people to share their understanding and deep expertise to come up with creative and practical ideas that help make considerable leaps in how we approach our shared challenges.

This is why KTN is a partner in the Medicines Manufacturing Industry Partnership (MMIP) alongside The Association of the British Pharmaceutical Industry (ABPI) and the BioIndustry Association (BIA), giving a voice to the technology and innovation experts across the sector to inform policy makers and funders.

From the inception of the Medicines Manufacturing Challenge Fund, KTN has worked hand in hand with industry, policy makers and UKRI to develop the Medicines Manufacturing Challenge scope, convene experts and run competition briefings. KTN has guided SMEs through the funding process, making connections to support consortia formation. KTN's role is now embedded through delivery of the Challenge Community.

'A successful medicines manufacturing sector depends on a connected ecosystem. KTN is proud to support the Medicines Manufacturing Challenge, helping innovative organisations work together to advance the UK's medicines manufacturing capabilities.'

Alicia Greated, Chief Executive Officer, KTN

'The Challenge Community enables wider collaboration, across the diversity of the medicines manufacturing sector itself and with other industries and researchers whose enabling technologies can provide solutions to our technology and innovation challenges.'

Andy Jones, Medicines Manufacturing Challenge Director, Innovate UK

Through the Medicines Manufacturing Challenge Community, KTN hosts events and facilitates workshops, designed to bring together industry, academia, Catapults and innovation centres to discuss technology developments and innovation opportunities. From viral vector manufacture, engineering biology, process analytical technologies and medicines formulation, KTN has published papers and case studies to inform a wider audience. This work has supported companies such as Autolus, Touchlight and Ipsen in securing funding to progress their R&D programmes. To date, KTN has interacted with over 700 engaged innovators in this space, accelerating progress in innovation that will drive change.

KTN's unique reach across many industry sectors means that organisations involved in medicines manufacturing are connected with expertise and solutions providers from outside the industry to tackle technology and innovation challenges. KTN brings together different disciplines in driving forward best practice for equality, diversity and inclusion or cross-cutting agendas like Net Zero and sustainability.

KTN continues to invest in the whole breadth of the Medicines Manufacturing Challenge Community, forming partnerships, championing innovation and shaping future solutions.

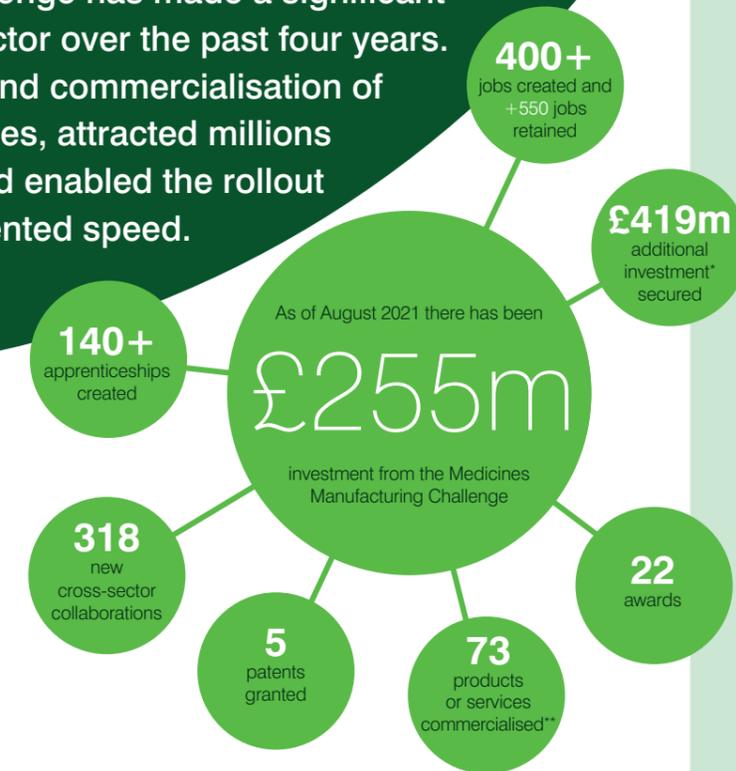
Manufacturing the future of medicine

The Medicines Manufacturing Challenge has made a significant impact on the UK's life sciences sector over the past four years. It has supported the development and commercialisation of innovative therapies and technologies, attracted millions of pounds of inward investment, and enabled the rollout of COVID-19 vaccines at unprecedented speed.

Alongside investing in technology and infrastructure for making new medicines and vaccines, the Medicines Manufacturing Challenge is helping to build the skilled workforce that is needed to develop and deliver the next generation of medical advances. Companies funded through the Medicines Manufacturing Challenge have created hundreds of jobs, and our apprenticeship scheme has provided opportunities for more than a hundred people to start a career at the cutting edge of medical science.

Investing in medicines manufacturing provides a golden opportunity to grow an economically powerful, vibrant industry that can pivot to support health resilience in time of need. Our unique infrastructure will play its part in the UK's reputation as a great place to do science, commercialise those ideas and build a business that thrives on innovation to drive speed, efficiency and scalability for future medicines manufacture. If we act now to build on the foundations that have been laid by the Medicines Manufacturing Challenge, we can become a powerhouse of sustainable medicines manufacturing that attracts investment from across the world.

The medicines manufacturing sector generates around £10 billion for the UK economy each year, while the global market for pharmaceutical manufacturing is predicted to reach \$673 billion by 2027. We are perfectly placed to capitalise on recent advances in transformative cell and gene therapies, with the potential to transform patient outcomes in many diseases. And, as the pandemic has shown, building domestic capacity to manufacture cutting-edge vaccines and therapies is an essential part of our future national health resilience and security.



Collaboration and knowledge sharing is a cornerstone of science and innovation. Through the Medicines Manufacturing Challenge and Medicines Manufacturing Challenge Community we have brought together key players across industry, academia and Government to generate innovative solutions for tomorrow's healthcare challenges, securing the UK's place at the forefront of the global life sciences industry and bringing health and prosperity here at home and around the world.

'Life sciences manufacturing is highly innovative, and offers opportunities to bolster health resilience but also deliver economic growth through high value jobs and exports.'

The Rt Hon Nadhim Zahawi MP, Minister for Business and Industry & Minister for COVID Vaccine Deployment [Aug 2021]

With thanks

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Andy Jones, Medicines Manufacturing Challenge Director, Innovate UK

Ian McCubbin, The Vaccine Taskforce Manufacturing Advisor & former Senior Vice President for Global Manufacturing and Supply at GlaxoSmithKline

Emilia Reyes Pabon, Apprentice Technician Scientist, Clinical Biomanufacturing Facility, University of Oxford

Fiona Thistlethwaite, The Christie NIHR CRF Director and Medical Oncology Consultant, iMATCH Director

Chris Vann, Senior Vice President, Chief Operating Officer, Autolus

The Rt Hon Nadhim Zahawi MP, Minister for Business and Industry & Minister for COVID Vaccine Deployment [Aug 2021]

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A list of references can be found on this webpage <https://ktn-uk.org/programme/medicines-manufacturing-challenge-community/>

*Additional investment includes R&D and operational costs

** Products or services commercialised, or expected to be commercialised, within 12 months



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