Introduction

The Cell and Gene Therapy Catapult (CGT Catapult) is an independent innovation and technology organisation committed to delivering impact for the cell and gene therapy industry in the UK. It delivers through the creation of powerful collaborations which overcome challenges to the advancement of the sector.

Contents

Chairman’s and Chief Executive’s statements ........................................................................................................... 6
Broadening the application of advanced therapies to more diseases ........................................................................... 8
Increasing access to more effective products .................................................................................................................... 10
Increasing efficiency in production ................................................................................................................................. 12
Securing tomorrow’s workforce .................................................................................................................................. 14
The future ............................................................................................................................................................................ 16
Financial highlights ......................................................................................................................................................... 17
The partnerships we have developed have helped to position the UK as a global leader in the development of advanced therapies. They continue to drive growth and investment in the development of advanced therapy medicinal products (ATMPs) and realise value for the UK economy.

To advance the industry, we collaborate with...

**academia and researchers**, to increase the flow and speed of translation of promising research into new therapies and supporting technologies...

**industry**, to bring down the cost of goods and increase the capacity to meet the upcoming demand for advanced therapies...

**healthcare services**, to increase access to clinical trials, uptake of approved products and bring down the cost of use.

The partnerships we have developed have helped to position the UK as a global leader in the development of advanced therapies. They continue to drive growth and investment in the development of advanced therapy medicinal products (ATMPs) and realise value for the UK economy.

---

**Our Vision:**

A thriving industry delivering life-changing advanced therapies to the world

**Our role**

Our role is to create powerful collaborations which overcome challenges to the advancement of the sector.

**How we work**

We are a team of experts covering all aspects of advanced therapies. Applying our own unique capabilities and assets, we collaborate with academia, industry and healthcare providers to develop new technology and innovation.

**Our impact**

Our outputs leverage research, transform barriers into industrial advantage and attract investment for our collaborators. We help people acquire new skills, organisations establish new capabilities and policymakers develop new perspectives.
2022/23 Cell and Gene Therapy Catapult outputs and outcomes

- 69 core projects
- 91 collaborative projects
- 72 international collaborations
- 39 university and research institute collaborators
- 168 companies collaborated with on ATMP innovation (49% of which are UK SMEs)
- £134m raised in 2022/23 by our UK collaborators in Stevenage
- £408m in financing raised by our UK collaborators
- 23 companies supported that are conducting clinical trials
- 7 companies being supported with long term GMP capability development and innovation
- 98 companies and 3,957 people upskilled and supported with training
- 252 Advanced Therapies Apprenticeships Community (ATAC) apprentices in the UK employed at 38 companies
### UK ATMP industry growth and CGT Catapult impact

#### Annual investment in ATMPs
- **2021**: £1.3b
- **2022**: £1.7b
- **2023**: £0.77b

#### Total ATMP GMP manufacturing facility space
- **2021**: 31,800m²
- **2022**: 40,000m²
- **2023**: 52,733m²

#### Phase III clinical trials carried out each year
- **2021**: 38
- **2022**: 44
- **2023**: 41

#### Employment in the advanced therapies and bioprocessing industries
- **2020**: 3,033
- **2022**: 6,956

#### Approved therapies reaching patients each year
- **2021**: 9
- **2022**: 10
- **2023**: 11
Chairman’s statement

We are at an exciting time for the cell and gene therapy industry. Various pharmaceutical and research companies are working on experimental therapies which have the potential to increase longevity and quality of life for many people.

To date, most advanced therapies that have come to market have been for rare diseases and specific cancer indications. Whilst medical advances in these areas are game-changing for those relatively few patients affected, we are now on the cusp of therapies becoming available for a range of more prevalent diseases. For example, millions of people globally have sickle cell disease, a genetic condition that affects the shape of red blood cells. Currently, people with this condition need to regularly take medicines or have blood infusions. While a bone marrow transplant can offer a cure, this is only possible for a limited number of individuals who have a suitable donor. Now, there are at least two companies close to having a gene therapy that treats this disease approved in the US.

Treatments like this, which address the cause of the disease rather than treat the symptoms, will not only revolutionise healthcare but will have further wide-ranging positive effects. For the economy, they could help people who are on long-term sick leave and their carers return to work. At the same time, the industry that researches, develops and manufactures these therapies contributes to the economy through providing jobs and investment.

For businesses and the economy, the past year has been a challenging time, especially for life science start-ups seeking investment. Despite challenges, the UK advanced therapy industry as a whole has remained strong over this period.

We must now strengthen our ambition and provide further support for the advanced therapies industry. The UK has strong academic institutions, many successful companies, and the CGT Catapult is in a strong position to support the continued growth of the sector. By building upon this existing ecosystem, we can ensure that the UK remains a world-leader in advanced therapies and that young talent is supported and given opportunities to thrive.

I am looking forward to the year ahead and to seeing the CGT Catapult continue to support the sector at a critical time in terms of securing its future success and seeing the benefits it brings for individual patients, the economy and society.
While the number of cell and gene therapies reaching approval is increasing, the advanced therapies industry remains nascent. For various ethical, technological and commercial reasons, the industry has started and flourished mainly in severe rare diseases and oncology, areas where patients and healthcare providers have the greatest unmet need.

The success that has been seen means that the industry is now applying the learnings and investment to higher prevalence conditions, such as haemophilia and Parkinson’s Disease. To accelerate this transition, various technological and market challenges must be overcome.

The healthcare system needs to be supported as it adapts from administering these treatments to few patients locally to many patients globally.

We will need to employ the conventional pillars of competitive large-scale manufacturing such as digitalisation and automation. In addition, we need to increase the pace of drug development, improve cost efficiencies for manufacture and use, and deliver more sustainable products and processes.

To build all of this, there needs to be a future workforce with the skills and passion the sector needs to drive innovation and support its continued growth.

At CGT Catapult, we envisage a future where there is a comprehensive range of effective advanced therapies available, treating rare and more prevalent diseases. I would like to thank all my colleagues at CGT Catapult for their dedication and hard work. Together, we will continue to provide the support that industry and healthcare providers need in order to make this future a reality.

I would also like to thank our collaborators as well as recognise the collaborative and financial support we receive from our stakeholders in Government, particularly Innovate UK.
Securing the benefits of advanced therapies in the UK

CGT Catapult is focused on building a thriving advanced therapies industry, with the health and economic benefits that the industry creates accruing to the UK.

Broadening the application of advanced therapies to more diseases

The industry has predominately brought advanced therapies for rare and complex conditions to market. These therapies have saved and improved many lives, for example, a treatment for spinal muscular atrophy, Zolgensma, has been delivered to over 3,000 children globally.

The gene therapy industry has developed new technologies, refined manufacturing and increased its understanding of the medical and supply chain challenges that are associated with advanced therapies. These learnings are now being directed at more prevalent conditions.

For cell therapies, there are many products in development. For example, clinical trials that use stem cell derived islet cells to treat people with type 1 diabetes, aiming to restore the body’s own ability to produce and regulate insulin, are in advanced stages.

For there to be a thriving advanced therapies sector in the UK and globally, there needs to be many companies working in this space, developing a wide range of products for different diseases.

14% of global ongoing ATMP commercial trials in all Phases I – III

5% of ongoing global ATMP clinical trials are active in the Advanced Therapy Treatment Centres (ATTC)

6% increase in clinical trials in the UK compared to the previous year (178 trials ongoing in 2022)

48 Phase II/III or Phase III clinical trials
**Case study: Autolus**

Supporting advanced therapy companies establish and grow their manufacturing capacity

**The Challenge:** Autolus, a CAR-T cell therapy company, was looking to transition from an early-stage research company to a robust clinical-stage development company. To achieve this, Autolus needed to establish capability to manufacture its autologous cell therapy candidates in an environment that met Good Manufacturing Practice (GMP) requirements.

Autolus worked with CGT Catapult on many steps of the journey including: developing a commercially scalable manufacturing process for autologous CAR-T products; establishing fundamental GMP processes; scaling their operations within CGT Catapult’s Stevenage Manufacturing Innovation Centre; and establishing highly productive, high-throughput supply chains.

The collaborative nature of the relationship has helped Autolus transition into a clinical-stage development company with its own commercial-scale manufacturing operations in the UK.

---

**Case study: Rinri Therapeutics**

Informing how unique therapies should be evaluated in clinical studies

**The Challenge:** Rinri Therapeutics is developing a cell therapy for hearing loss and sought input on optimal clinical development.

CGT Catapult supported Rinri in assessing clinical feasibility and adoption potential of their experimental therapy in different subpopulations with hearing loss, informing inclusion criteria for enrolment in clinical trials and outcomes to be collected for demonstrating therapy value. This included outcomes research, health economic analysis and engagement with clinical experts. CGT Catapult also supported Rinri with the Innovative Licensing and Access Pathway in order to further inform evidence generation plans.

The support from CGT Catapult is helping Rinri develop its clinical development strategy so it can demonstrate the full value of its potential therapy to regulators and healthcare systems.
Increasing access to more effective products

To accelerate the creation of a healthcare system where advanced therapies are widely available, there needs to be more products available with a lower cost of manufacture and use.

A major component of cost can be a lack of standardisation. Manufacturers need to work collaboratively, where possible, aligning manufacturing, logistical and quality assurance processes and practices. The different methods and procedures often used can create unnecessary barriers to product adoption and administration by the healthcare system.

There is also a need to ensure that the healthcare system has the capacity to receive and administer advanced therapies to larger numbers of patients.

Currently, only a limited number of centres in the UK are equipped to provide advanced therapies. As more therapies become available via the NHS, there will be a need for more centres with the requisite specialised infrastructure and workforce. At the same time, industry needs to work to reduce the requirement for healthcare workers to have specialist skills to deliver therapies to patients.

The Advanced Therapy Treatment Centre (ATTC) network, coordinated by CGT Catapult, hosts an Advanced Therapies NHS Readiness Toolkit. This provides templates and exemplar documents that aim to help prepare healthcare organisations for the development of local structures, systems, pathways, procedures, processes and workflows, that are needed to administer advanced therapies. By addressing the gaps in centre readiness, the NHS should be able to swiftly deliver clinical trials and approved therapies as and when they are made available.
Case study: Central Pharma

Streamlining supply chains to support high throughput manufacture

The Challenge: CGT Catapult was looking to reduce bottlenecks and increase agility and robustness in the complex material supply chains for biomedicines.

The list of materials required to produce advanced therapies is extensive and includes a mixture of temperature-sensitive materials plus sterile components which ensure that therapies are not contaminated during manufacturing. Before these materials arrive in the location where they will be used to manufacture a therapy, they have to be individually picked, packed and surface cleaned, often two or three times throughout the supply chain.

To streamline the process, CGT Catapult worked with Central Pharma, a specialist pharmaceutical supply chain company, to deliver a new sterile kitting facility focused on component assembly and supply to the point where the materials are needed. In this process, the materials are picked and then cleaned in specialist clean rooms, before being packed, sealed and transported to the manufacturer.

This new procedure removes the need for multiple stages of cleaning, saving the collaborators’ time and resources. It is being used by collaborators at the Stevenage Manufacturing Innovation Centre to demonstrate how it benefits collaborators as well as to refine the approach.
Increasing efficiency in production

The advanced therapy sector is reaching an inflection point where step changes in productivity, throughput and cost-effectiveness will drive realisation of the industry’s full potential.

Digital and data technologies have transformed other sectors to improve efficiencies and productivity but, for the advanced therapies sector so far, digital solutions have been limited and adoption has been slow. There is a need to identify and overcome the barriers blocking digital adoption.

In March 2023, CGT Catapult opened a new Process and Analytical Technologies (PAT) Laboratory which has been specifically designed and equipped with automated sample handling and analytical technologies to allow cell and gene therapy developers to monitor and study their advanced therapy manufacturing processes. The state-of-the-art facility helps collaborators optimise their manufacturing process and potentially deploy real-time automated process control to improve process robustness and yield.

Spotlight on AAV manufacture

One key area in the development of gene therapies that needs to be made more efficient is the production of adeno-associated viruses (AAVs), which are used in many gene therapies. The production of these materials is currently highly inefficient, with less than 1% of the AAV particles produced containing functional genetic material. By better understanding how the AAV viral particles are produced and combined within cells, it should be possible to substantially increase the quality and yield, resulting in better and safer products being produced at substantially lower cost.
**Case study: Orchard Therapeutics**

**Boosting expertise in process innovation**

**The Challenge:** Orchard Therapeutics, a gene therapy company focused on unlocking the therapeutic potential of hematopoietic stem cells (HSC), was looking to further improve and reduce the cost of its manufacturing process.

Orchard Therapeutics sought to identify new cell clones for the manufacture of their viral vector and to reduce the amount of manual handling required in the manufacturing process. They also wanted to test experimental analytical methods to identify new biomarkers.

To achieve these aims, Orchard Therapeutics and CGT Catapult initiated a commercial collaboration to develop process and analytical capabilities to aid the selection of clonal cell lines to be used in the manufacture of an experimental gene therapy for a late-stage clinical development programme. The knowledge gained from the collaboration has enabled Orchard to establish more efficient tools for the manufacturing of their viral vector starting materials and explore cutting-edge technologies, bringing an enhanced process understanding through biomarkers application, as well as access to new closed, automated drug product manufacturing processes that bring significant improvements over earlier generation processes.

**Case study: NHSBT & University of Sheffield**

**CGT Catapult’s AAV platform transferred to sites across the UK**

**The Challenge:** Enabling industry and academia with access to a scalable platform for AAV production.

LifeArc, MRC and BBSRC identified a need for an academic focused viral vector manufacturing capability in the UK. The three organisations ran a competitive process and selected NHS Blood and Transplant (NHSBT), Sheffield University and Kings College London to create three Innovation Hubs for Gene Therapies. The NHSBT and Sheffield hubs will manufacture AAV vectors and collaborated with the CGT Catapult for the project.

CGT Catapult leveraged its established and scalable AAV manufacturing process and a suite of analytical methods to NHSBT’s Clinical Biotechnology Centre and Sheffield University’s Gene Therapy Innovation and Manufacturing Centre, creating new AAV manufacturing capability in the UK for academia and industry to access. The intention is to continually improve the manufacturing process, as understanding of this process increases.
Securing tomorrow’s workforce

Ensuring that the UK has a strong future talent base is foundational to growth of the advanced therapies sector. With levels of digitalisation and automation in the development and manufacturing of therapies increasing, there are jobs emerging at the cutting edge of technology, and there is a need to ensure that there is a pipeline of talent with the skills needed to create and operate these innovative technologies.

The Advanced Therapies Apprenticeship Community (ATAC) and Advanced Therapies Skills Training Network (ATSTN) programmes, delivered by CGT Catapult working with industry and academia, have been effective in training talent for the advanced therapy and biomanufacturing sectors. However, more needs to be done to build long-term workforce capability and capacity at all levels.

From schools and colleges, through apprenticeships and universities, the advanced therapy sector provides a range of fulfilling career pathways, suited to different skillsets, yet these rewarding jobs are often not well understood outside of the sector. There needs to be a concerted effort from across industry, training providers and policy makers to promote the industry as a positive, rewarding choice for young people.

CGT Catapult has also been supporting the upskilling of NHS staff through the Advanced Therapy Treatment Centre (ATTC) network. This aims to develop robust systems for the routine delivery of advanced therapies throughout the NHS. A skilled healthcare workforce, equipped with the skills that are needed to handle and administer advanced therapies, will be crucial to these therapies becoming more widely available.
Case study: London Advanced Therapies

Preparing the NHS to deliver advanced therapies

The Challenge: As advanced therapies become more common there is a need to ensure the NHS has the skills and expertise needed to deliver them to patients.

To help the NHS prepare for this new wave of medicines, London Advanced Therapies and CGT Catapult performed a comprehensive analysis of the training that NHS staff involved in the use and delivery of advanced therapies need to perform their roles effectively. This analysis included identifying training that is currently provided, where needs exist and how these can be addressed.

The resulting recommendations provide a framework for the development of a programme that would support the training of NHS staff.

Case study: Oxford Biomedica

CGT Catapult and Oxford Biomedica work together to upskill employees and promote a culture of learning

The Challenge: Supporting a specialist company working in the advanced therapies sector to train and inspire their employees.

Oxford Biomedica, a leading UK-based viral vector specialist company, was looking to create a culture of learning, with valuable training content available to employees at all levels. They worked with CGT Catapult to develop a programme of online content, which was provided through the Advanced Therapies Skills Training Network’s Online Training Platform. The programme covered a range of content, including courses to deepen understanding of technical knowledge, courses to broaden knowledge around the processes followed in other departments, and courses to strengthen behavioural skills.

After an initial pilot, the programme was rolled out to all employees and over 740 individuals have registered and over 840 courses have been completed.
The future

Advanced therapies can significantly change the structure of healthcare, improving patient outcomes and quality of life. While there are now 11 advanced therapies approved and reimbursed in the UK, for diseases including specific forms of leukaemia, spinal muscular atrophy and retinitis pigmentosa, and over 2,000 are in clinical trials around the world, this industry is still young.

To realise the industry’s full potential and unlock the health and economic benefits of advanced therapies, significant change is needed in a variety of areas: there needs to be more therapeutics for more conditions; the cost of manufacture and use needs to fall significantly; we need the capacity to manufacture high-quality product in large volumes and uptake needs to increase in response to this improved and lower cost supply.

CGT Catapult is committed to continuing on this journey with its partners, identifying the barriers the advanced therapy sector faces and providing the solutions that are needed both today and in the years to come.
## Financial highlights

### Income

<table>
<thead>
<tr>
<th>For year ended 31st March 2023</th>
<th>2023 £’000s</th>
<th>2022 £’000s</th>
<th>2021 £’000s</th>
<th>2020 £’000s</th>
</tr>
</thead>
<tbody>
<tr>
<td>Innovate UK core grant funding</td>
<td>19,400</td>
<td>14,500</td>
<td>14,200</td>
<td>15,800</td>
</tr>
<tr>
<td>Third party grant funding</td>
<td>26,200</td>
<td>34,500</td>
<td>34,500</td>
<td>8,100</td>
</tr>
<tr>
<td>Industrial income</td>
<td>23,600</td>
<td>25,300</td>
<td>21,200</td>
<td>14,900</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>69,200</strong></td>
<td><strong>74,300</strong></td>
<td><strong>69,900</strong></td>
<td><strong>38,800</strong></td>
</tr>
</tbody>
</table>

### Balance sheet

<table>
<thead>
<tr>
<th>For year ended 31st March 2023</th>
<th>2023 £’000s</th>
<th>2022 £’000s</th>
<th>2021 £’000s</th>
<th>2020 £’000s</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed assets</td>
<td>82,500</td>
<td>81,800</td>
<td>74,600</td>
<td>56,300</td>
</tr>
<tr>
<td>Net current assets</td>
<td>30,400</td>
<td>34,400</td>
<td>28,300</td>
<td>12,500</td>
</tr>
<tr>
<td>Creditors</td>
<td>(11,600)</td>
<td>(17,600)</td>
<td>(17,100)</td>
<td>(7,000)</td>
</tr>
<tr>
<td>Provision for liabilities</td>
<td>(20,300)</td>
<td>(19,900)</td>
<td>(13,600)</td>
<td>(10,300)</td>
</tr>
<tr>
<td>Net assets</td>
<td>81,000</td>
<td>78,700</td>
<td>72,200</td>
<td>51,500</td>
</tr>
<tr>
<td>Capital and reserves</td>
<td>81,000</td>
<td>78,700</td>
<td>72,200</td>
<td>51,500</td>
</tr>
</tbody>
</table>
Corporate governance

Cell Therapy Catapult Limited* is an independent, not-for-profit company limited by guarantee.

CGT Catapult receives substantial grants from Innovate UK and works in coordination with them while remaining independent and self-governing.

Operating subsidiaries
Cell Therapy Catapult Services Limited and the CGT Catapult Manufacturing Innovation Centre Ltd.

Our committees as of April 2023
We have established three committees that meet independently and make recommendations for the Board.

CGT Catapult Nomination Committee members
- Ian McCubbin, CBE (Chair)
- Hilary Newiss
- Stuart Henderson

CGT Catapult Remuneration Committee members
- Dr Steven Chatfield (Chair)
- Hilary Newiss
- Christine Soden

CGT Catapult Audit Committee members
- Christine Soden (Chair)
- Dr Steven Chatfield
- Prof. Angela Thomas, OBE, PhD, FRCPEdin, FRCPath
- Prof. Sir Bruce Keogh, KBE, FMedSci

*Cell and Gene Therapy Catapult is a trading name of Cell Therapy Catapult Limited, registered in England and Wales under company number 07964711, with registered office at 12th Floor Tower Wing, Guy’s Hospital, Great Maze Pond, London, SE1 9RT. VAT number 154421433.
Non-Executive Directors

Ian McCubbin, CBE
Chairman

Dr Ian Campbell, OBE
Director

Dr Steven Chatfield
Director

Prof. Uta Griesenbach
Director

Prof. Sir Bruce Keogh, KBE, FMedSci
Director

Hilary Newiss
Director

Christine Soden
Director

Prof. Angela Thomas, OBE, PhD, FRCPEdin, FRCPath
Director
Executive Team

Matthew Durdy  
Chief Executive

Dr Jonathan Appleby  
Chief Scientific Officer

Dr Jacqueline Barry  
Chief Clinical Officer

Philip Brady  
Chief Financial Officer

Jeanette Evans  
Chief Business Officer

Dr Nick Johnson  
Chief Strategy & Impact Officer

Dr Stephen Ward  
Chief Manufacturing Officer
Thank you to the people and organisations we have worked with over the year, including:

**Funders**

- Innovate UK
- Biotechnology and Biological Sciences Research Council
- Engineering and Physical Sciences Research Council
- Department for Science, Innovation & Technology
- European Commission
- European Union European Regional Development Fund
- Hertfordshire Local Enterprise Partnership
- lifeArc
- Medical Research Council
- Scottish Enterprise
- UK Research and Innovation

**Investment community**

- argobio studio
- Deep Science Ventures
- lifeArc
- Scottish Enterprise

**National and international organisations**

- abpi
- airto
- Alliance for Regenerative Medicine
- BIA
- eatris
- HESI
- International Society for Stem Cell Research
- London Advanced Therapies
- MMIP
- University CATALYST
- Scottish Enterprise

**Researchers and charities**

- University of Sheffield/AMRC
- Anthony Nolan
- Cardiff University
- Charité
- CIRAF
- Imperial College London
- Kings College London
- Medizinische Hochschule Hannover
- National Horizons Centre
- Newcastle University
- Queens University Belfast
- University of Birmingham
- University of Glasgow
- University of Manchester
- University of Oxford
- University of Sheffield
National and international companies

National Health Service

Regulators
We would also like to recognise the organisations that work with the ATTC