AstraZeneca has pioneered the use of circulating tumour DNA (ctDNA) in the diagnosis of cancer. Pieces of DNA break off from a tumour and circulate in the bloodstream where they can be analysed to give genetic information about a patient’s tumour. This allows healthcare professionals to determine the right treatment for the patient using a non-invasive blood test.
What science can do

At AstraZeneca, our purpose is to push the boundaries of science to deliver life-changing medicines. We will achieve this by placing science at the centre of everything we do.

IMED Biotech Unit
Focuses on using state-of-the-art discovery platforms and translational science in small molecules, oligonucleotides and other emerging technologies.

MedImmune
Focuses on biologics across our core areas and pioneers innovative research using unparalleled expertise in protein engineering, translational sciences and immunology.

Global Medicines Development
The science engine room that drives late-stage development of our innovative pipeline, transforming exciting science into valued new medicines and ensuring patients around the world can access them.

Our approach to Research & Development
Distinctive science starts in our two biotech units, which conduct innovative discovery research and early-stage development from initial target selection to Phase II trial completion before transitioning to Global Medicines Development.

It’s science that compels us to push the boundaries of what is possible. We trust in the potential of ideas and pursue them, alone and with others, until we have transformed the treatment of disease.

The future of treatment for many of today’s diseases lies in uncovering mechanisms that are newly emerging or still to be discovered. We believe the best way to help patients is to focus on breakthrough science to identify these mechanisms and then use our distinctive capabilities to develop novel, targeted therapies.
Our IMED Biotech Unit

We are committed to driving scientific advances in small molecules, oligonucleotides and other emerging technology platforms to push the boundaries of medical science.

Each year we invest in excess of $1bn on discovering and developing the next generation of life changing medicines, from initial target selection through to the end of Phase 2 trials. We employ over 2,000 scientists and undertake research on a truly global scale, operating vibrant science centres across three continents.

Partnering and collaboration is a way of life for our teams. We work alongside scientists at many of the world’s leading academic institutions to increase our understanding of disease physiology and help identify potential new drugs.

We are pioneering new approaches to open innovation, creating a permeable research environment where scientists can more freely share their ideas and collaborate on projects with the best external scientists. We remain committed to openness and accessibility, and will continue to identify new and innovative ways to connect the great science happening in our labs with the best external science around.

We believe in the potential of ground-breaking science to transform the lives of patients. We do this by focusing on three key priorities.

“Now is a great time to be a scientist in AstraZeneca. Working across a range of therapy areas, our IMED teams are focused on translating the really cool science that is happening in our labs into the next generation of medicines that patients need. To make this happen, we need great partners who share our passion for science and who have the drive and determination to meet the unmet needs of patients around the world.”

Mene Pangalos, EVP, IMED Biotech Unit

Fostering a culture where science thrives – one that is dynamic, agile and entrepreneurial.

Creating an environment open for innovation – where our teams work side by side with our academic and industry partners to make the next breakthrough.

Challenging conventional thinking – we encourage our people to apply scientific rigour in challenging the way we do things.
Where science thrives

We are achieving scientific leadership through a dynamic, agile and entrepreneurial culture that feels like a biotech but has the resources of a major global pharmaceutical company.

~2,500 people with a passion for science

Almost 1,000 papers published over 2014 and 2015

Over 45 High Impact publications in past two years

Over $1bn invested in scientific research each year

**Inspiring great scientists**

Our plan to achieve scientific leadership rests on our ability to attract and retain the best scientists. We continue to attract senior scientists from academia and industry. Why? Because the quality of our science and the potential of our pipeline make the IMED Biotech unit a great place to work.

At the same time, we are committed to inspiring the next generation of scientists by giving them opportunities to develop their skills and follow the science they are passionate about.

**Building our scientific reputation**

Our scientists and teams are encouraged to publish their work in peer reviewed journals. Demonstrating the quality of the research conducted in our labs, particularly in high quality and high impact journals, is an essential element in building our scientific reputation and our plans to achieve scientific leadership for AstraZeneca. It is also a critical consideration for recruiting and retaining the best scientists from around the world.

**Delivering a step change in R&D productivity and output**

Since it was formed in 2010, the IMED Biotech Unit has helped deliver sustainable improvements in R&D productivity across AstraZeneca. In recent years, we have created a leaner, simpler organisation, focused on driving distinctive science across our key therapy areas.

Through a rigorous focus on great science, we have developed a robust clinical pipeline across our core therapy areas of oncology, respiratory and inflammation and cardiovascular disease. We also continue to progress the most promising projects in neuroscience in collaboration with partners and in small molecule anti-infectives through our standalone company, Entasis Therapeutics.

**Focusing on quality not quantity**

A comprehensive review of our IMED small-molecule drug projects took place from between 2005 and 2010. This helped us identify the most important factors for project success and pipeline quality.

We call this our 5R framework.

The 5R framework emphasises quality rather than quantity in our research and development. That’s why a sixth critical factor is having the right culture. IMED has established a culture where our teams are ‘truth seeking’ in their behaviour and rigorous in their approach to asking the critical ‘killer’ questions. Rather than being rewarded for hitting the next milestone, our scientists are rewarded for thinking about what it would take to deliver a viable, differentiated medicine.

Both our IMED teams and our Early Stage Portfolio Committee (ESPC) use this framework to ensure we are progressing the right projects, asking the right questions and making the right decisions at key review points throughout the drug development process. This approach is now embedded into the way our teams work and is used by the ESPC to review and approve pipeline progressions.

**Our 5R framework**

- **Right target**
  - Strong link between target and disease
  - Differentiated efficacy
  - Available and predictive biomarker

- **Right tissue**
  - Adequate bioavailability and tissue exposure
  - Definition of PD biomarkers
  - Clear understanding of preclinical and clinical PK/PD
  - Understanding of drug-drug interactions

- **Right safety**
  - Differentiated and clear safety margins
  - Understanding of secondary pharmacology risk
  - Understanding of reactive metabolites, genotoxicity, drug-drug interactions
  - Understanding of target liability

- **Right patients**
  - Identification of the most responsive patient population
  - Definition of risk-benefit for given population

- **Right commercial opportunity**
  - Differentiated value proposition versus future standard of care
  - Focus on market access, payer and provider
  - Personalised healthcare strategy, including diagnostic and biomarkers

Our therapeutic focus

The future of treatment for many of today’s diseases lies in uncovering mechanisms that are newly emerging or are still to be discovered.

We believe the best way to help patients is to focus on breakthrough science to discover these mechanisms and develop novel, targeted therapies that interact with them. Our focus in IMED is on the following three main therapy areas:

Cardiovascular and Metabolic diseases

We also pursue opportunity-driven projects in Neuroscience.

Cardiovascular & Metabolic Diseases iMed

Our strategy in CVMD focuses on ways to reduce morbidity, mortality and organ damage by addressing multiple risk factors across cardiovascular (CV) disease, diabetes and chronic kidney disease indications. The patient-centric approach is reinforced by science-led lifecycle management programmes and technologies, including early research into regenerative methods.

Oncology iMed

Our vision is clear. To help patients by redefining the cancer-treatment paradigm, with the aim of bringing six new cancer medicines to patients between 2013 and 2020. A broad pipeline of next-generation medicines is focused principally on four disease areas – breast, ovarian, lung and haematological cancers. We have one of the broadest and deepest pipelines in the industry, spanning Immuno-Oncology, DNA Damage Response and targeted therapies.

Respiratory, Inflammation & Autoimmunity iMed

AstraZeneca holds a unique position in respiratory disease, including asthma, chronic obstructive pulmonary disease (COPD) and idiopathic pulmonary fibrosis (IPF), with a range of differentiated, potential medicines in development by leveraging novel combinations, biologics and devices. The pipeline also has a number of promising assets in inflammatory and autoimmune diseases within areas such as psoriasis, psoriatic arthritis, gout, systemic lupus and rheumatoid arthritis.

Neuroscience iMed

The Neuroscience iMed model is unique in that it is dynamic, small and predominantly externalised, forming partnerships with leading-edge academic researchers, foundations and companies to create a portfolio of discovery and early development projects in neurological and psychiatric disease.
Developing science talent

Our Graduate Programme is designed for those with a passion for science, and a desire to make a genuine difference to the lives of patients – today and in the future.

Graduate programme
A two year programme, graduates complete three placements across Innovative Medicines and Early Development with a focus on breadth of experience. In addition to three placement line managers, graduates are supported by a mentor for the duration of the programme to offer career counselling and guidance.

In addition to developing your technical skills working with world-class scientists with state-of-the-art facilities, all graduates are enrolled onto the Global Graduate Development Programme where we focus on the softer skills that are required to make the successful transition into industry.

Post doctoral programme
The Post-Doc Programme brings together motivated and innovative post-doctoral scientists who have a passion for great ideas and a desire to make a difference through an academic style post-doctoral position in a global pharmaceutical setting.

The two year programme funds post-doctoral projects originating from internal scientists/clinicians across the research areas and scientific disciplines within AstraZeneca. These projects address fundamental scientific challenges that underpin drug discovery and development. In addition, each post-doctoral scientist receives a tailored training and development programme encompassing key skills such as presentation delivery and publication writing.

Chief Scientist programme
As part of our drive for the best science we are committed to working with the best scientists, both inside and outside the pharmaceutical industry. To ensure that we are able to attract top science talent from academia, we have developed our flexible Chief Scientist programme. By tailoring individual arrangements to enable scientists to work with AstraZeneca IMED full time, part time, or on assignment from a university, we encourage a permeable research environment meeting the needs of both the institution and individual.

Being flexible in our approach enables scientists of the highest calibre to stay connected to their research, their universities and to work flexibly between their commitments, while allowing us to connect with the best scientific minds to discover and develop new medicines.

Throughout AstraZeneca, there is true intent to follow the science. Combining my academic and clinical work with my AstraZeneca role puts me at the hard face of drug development. I see my primary job as being part of the IMED and driving our portfolio, but I have a live interface with patients and academia which keeps me awake and sharp, and which gives me many ideas. At AstraZeneca you can do world-class science but you can explore your scientific talents as well as your leadership talents. It’s a friendly, collaborative company and there is such a wide spread of people, skills and experiences. AstraZeneca offers an opportunity for curious people to explore.”

Prof. Dr Maarten Kraan MD PhD
VP, RIA IMed, Adjunct Professor of Rheumatology at Gothenburg University
Open for collaboration

Our teams are leading the way in creating an open research environment that goes beyond the usual collaboration models.

We continue to find new and innovative ways of collaborating with academic institutions, biotechs and pharmaceutical companies. In many cases, our scientists work side-by-side with partner scientists, advancing the science together as one team.

We are open to exploring new and different kinds of collaborations. Current partnership models include in-licensing of new chemical modalities and platforms; partnerships to leverage our compound collection to uncover novel target opportunities and collaborations designed to build our understanding of the mechanisms of disease.

During the last two years alone, our teams have established more than 130 new collaborations and partnership agreements.

Harnessing our footprint

With research facilities in a number of the world’s established and emerging scientific centres, we recognise the importance of leveraging our footprint to connect with the best external science, accelerating our scientific partnerships and alliances with leading academic and biotech partners around our sites.

Working more openly with leading scientists around the world

Our dedicated open innovation portal makes it easier for external researchers to access the full range of open innovation programmes and identify ways to collaborate with our teams.

Through this website, external scientists can access:

- A clinical compound bank of ‘patient-ready’ active and discontinued compounds. In previous trials, these compounds have shown evidence of human target coverage and tolerability. They are being offered for novel clinical and translational research
- A pharmacology toolbox, which comprises compounds with strong pharmacological properties. These compounds are being made available for preclinical research to explore novel disease biology and advance scientific knowledge
- Collaborative efforts to validate new targets, which could include the availability of high-throughput screening capabilities to investigators
- Advanced cheminformatic capabilities to explore the properties and therapeutic innovation potential of new molecules

Researchers can also suggest solutions to R&D challenges, or suggest fantastic ideas above and beyond ideas related to compounds and screening. AstraZeneca is seeking to collaborate with and reward those who bring innovative solutions to ongoing challenges.

http://openinnovation.astrazeneca.com/

Partnering with the best

Our agreements with the UK Medical Research Council, the National Institutes of Health in the US, and the National Research Program for Biopharmaceuticals in Taiwan, have enabled academic researchers to start unlocking the full potential of some of our discontinued compounds to develop new medicines for diseases such as Alzheimer’s and cancer.

In addition, collaborations with renowned academic organisations such as Karolinska Institutet in Sweden and with leading charities and governmental organisations, including Cancer Research UK, the National Cancer Institute and the National Institute of Mental Health in the US, are enabling our teams to work side by side with like-minded scientists who share our passion for transforming the lives of patients.

“This is a unique collaboration, which is helping to maximise the potential of many compounds, any one of which could prove a scientific breakthrough. Our partnership with AstraZeneca is a perfect combination because it enables academia to benefit from the work of a leading pharmaceutical company in a way that could advance scientific understanding of a wide range of diseases.”

Chris Watkins, Director of Translational Research, UK Medical Research Council
Delivering the next generation of life changing medicines requires a new way of thinking that embraces alternative ideas and new methods. It needs people who can pioneer new practices and work across fields of scientific discovery. It needs people who continue to push themselves to be the best at what they do. And it needs people who will rigorously interrogate what they know, relentlessly searching for new opportunities to bring benefit to patients. Within the IMED Biotech Unit we are creating a dynamic culture where anything is possible; where our people are encouraged to challenge the status quo and are rewarded for following the science and seeking the truth.

Entrepreneurial thinking drives new research approaches

The IMED Biotech Unit forged a unique new model to drive neuroscience innovation – the Neuroscience virtual Med. This bold approach to neuroscience drug discovery research and development was designed to address the significant challenges the pharmaceutical industry faces in bringing new neuroscience medicines to market.

Advanced Drug Delivery

Improved understanding of the physiological barriers to efficient drug delivery has resulted in significant advances in delivery systems. This, coupled with novel analytical and imaging techniques allow for even more sophisticated delivery systems opening up new target space. Our team is looking to improve target efficacy by enhancing our targeting capabilities to allow delivery of both small molecules and oligonucleotide therapeutics – mRNA, miRNA and antisense. To do this our team is focused on three key areas: 1) cellular targeting, 2) improving cellular uptake and 3) enhancing drug delivery. In the latter case, we have already initiated collaborations with BIND Therapeutics for its ACCURINS® polymeric nanoparticle technology and with Starpharma exploring their dendrimer technology platform. Both these technologies improve therapeutic index and ability to formulate challenging molecules.

iLead in Lead Generation

How can IMED deliver a therapeutic agent for any portfolio target? The team is developing strategies that explore next-generation approaches to small molecule hit identification and the optimisation of peptides and cyclic peptides as novel therapeutic modalities.

Organs on a Chip

In 2015, we established Entasis Therapeutics, an independent company focused on the discovery and development of novel antibacterials to address the serious medical need posed by multidrug-resistant bacterial infections. The team enjoys the culture and energy of a small biotech, combined with the experience and portfolio of a global pharmaceutical company. In addition to driving internal research programmes, the team also seeks to engage with external partners.

Incorporating biosensor technology into our pre-clinical studies will allow us to change current practice, improve translation and safety read-outs, while reducing the number of animal studies. Current technology allows measuring the body’s vital signs using health patches but our team recognises the true value for pre-clinical monitoring lies with invasive biosensor technology. In the future, developing pre-clinical sensors that monitor drug exposure and biomarkers of safety and efficacy will have the potential for clinical use – providing online biosensors for patients, and hence changing the status quo for patient care.

iDecide

iDecide is a clinical informatics research and development framework enabling early and better decision-making in clinical studies. In collaboration with the Manchester Cancer Research Centre (MCRC), iDecide is designed to integrate, maintain and assess data during an ongoing study utilising real-time feedback from patients. Leveraging this patient-centric information in a timely manner enables appropriate adjustment to clinical trial design, saving resources and time whilst enabling us to administer the right dose, of the right drug to the right patient.

In the future, developing pre-clinical sensors that monitor drug exposure and biomarkers of safety and efficacy will have the potential for clinical use – providing online biosensors for patients, and hence changing the status quo for patient care.

Digital IMED

The wealth of ‘big data’ in healthcare is revolutionising our approach to R&D. We are already seeing how the next generation of medicines are being shaped by our ability to capture, interpret and apply data. Combining insight from clinical health records with large-scale genomics data is enabling scientists to better predict disease outcomes in the clinic. Our team has been investigating connecting multiple data stacks from anywhere and of any type, from proprietary data to real world evidence, even social media platforms. This data stack would truly allow us to map 360 degrees views of patient journeys and gain understanding of the interplay between ‘nature’ (from genetic information) and ‘nurture’ (environmental data e.g. smartphone sensor data) to make breakthroughs in science and ultimately patient care.
In pushing the boundaries of science, we continue to harness our unique mix of scientific skills and capabilities, by providing our people with the tools they need to deliver industry-leading R&D performance.

But we also know that by itself, this will not be enough. We need people with a burning passion for what science can do.

When you visit an IMED site, you will meet people who are inspired by science and its capacity to transform the lives of patients. You will notice the pride our people have in what we’ve achieved; the breakthroughs we’ve made, the medicines we’ve developed and the lives we’ve helped to transform.

Our people are passionate about their work. They are also creative and entrepreneurial with a relentless drive to translate the great science happening in our labs into the next generation of medicines to transform disease.

Interested in joining our IMED Biotech Unit?
www.astrazenecacareers.com/career-areas/research-and-development/IMED

Our people make us stand out and our values define us
Across AstraZeneca, our values define how we work. Science and patients come first. Entrepreneurial thinking is encouraged – as is speaking up.

We want people to be candid and do the right thing – not just the easy thing. These values help us drive scientific leadership and make a meaningful difference to patients.

Our AstraZeneca values

**We follow the science**
**We put patients first**
**We play to win**
**We do the right thing**
**We are entrepreneurial**

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Key skills and capabilities in the IMED Biotech Unit

**Translational science & biology**

Our bioscience groups are accountable for testing biological hypotheses by using in vitro and in vivo assays and innovative disease models. Our teams excel in the analysis of disease tissue and the application of bio-informatic approaches to support the identification and validation of targets regulating biological processes. We run an active post doc programme, pursuing blue skies research to help improve our understanding of disease. Our translational expertise enables us to accelerate the development of new druggable targets in human disease and select the right patients in early clinical trials. Our Early Clinical Development team specialises in interpreted quantitative data analysis developed using the latest, model-based drug development techniques and technologies.

**Medicinal Chemistry**

Our medicinal chemistry capabilities enable us to integrate structural, pharmacological, pharmacokinetic and toxicological information to support the innovative design of novel chemical compounds. Pushing the boundaries of medicinal chemistry enables the delivery of new candidate drugs into our pipeline and is the foundation of small molecule drug discovery across the company. We also work on next generation devices and delivery through our pharmaceutical development group.

**Clinical development**

Our Early Clinical Development team designs and delivers early phase development strategies and exploratory studies that build the credentials of novel targets. Clinical Operations delivers global clinical trials for late stage projects across our pipeline, using both internal and external programme and study management expertise. Our leading expertise in large outcomes, multi-site studies with thousands of patients, many of which include a personalised approach.

**Drug safety and metabolism**

We apply our drug metabolism and pharmacokinetics (DMPK) expertise to deliver in vitro and in vivo data, mass spectrometry imaging data, expertise and isotopically labelled compounds to our project teams. By following the science and combining our expertise with that of our external partners, our teams accelerate the discovery and development of safe, new medicines across our focus areas. We also apply our discovery safety expertise to deliver in silico, in vitro and in vivo data for target and chemical risk assessments and deliver quantitative translational safety models for functional and pathological safety signals.

**Pharmaceutical Sciences**

Pharmaceutical Sciences ensures we implement intelligent design of medicines and delivery systems. By focusing on three priority areas – Early Chemical Development, Early Product Development, and Advanced Drug Delivery, the team supports formulation and delivery for IMED’s portfolio across the main therapy areas, from early discovery to Phase Ib clinical trials. The group is closely involved with project teams to influence the design of new molecules and early clinical trials, and specialise in cutting-edge drug delivery system technology to support our ever-expanding drug platforms and modalities.

Our AstraZeneca values

**We follow the science**
**We put patients first**
**We play to win**
**We do the right thing**
**We are entrepreneurial**
**Our thriving science centres**

**UK – Cambridge**
In 2013, AstraZeneca announced plans to move our UK research activities to a new $500m facility in the centre of Cambridge. Our new facility at the Cambridge Biomedical Campus will become the company’s largest centre for oncology research and a centre of excellence for pre-clinical research, medicinal chemistry and high-throughput screening. As we expand our presence in the city, our transition from the North West means a small number of IMED colleagues will remain at our Macclesfield campus, and at Alderley Park until our R&D exit of the site is completed. The growing Alderley Park BioHub is successfully creating an optimum environment for emerging businesses to thrive.

**Sweden – Gothenburg**
Our strategic R&D centre in Gothenburg is the centre of our research for two of our therapy areas of cardiovascular & metabolic diseases and respiratory & inflammation. It is also home to a large number of our scientists from our early phase Discovery Sciences unit and our Drug Safety and Metabolism team. Our vibrant Gothenburg facility has seen their BioVentureHub go from strength to strength since its inception in 2014, with both industry and academic groups now working in this innovative ecosystem.

**US – Boston**
Boston is home to AstraZeneca’s small-molecule research in North America, with state-of-the-art laboratories in Waltham, just west of the city centre. Our Boston-based scientists focus on the discovery and development of new medicines for the treatment of cancers and neurological disorders. The site also houses the Gatehouse Park BioHub, which is thriving with a number of research companies already in place since launch towards the end of 2015.

**China – Shanghai**
Our small molecule research facility in China is located at the Zhangjiang High Tech Park in the Pudong area of Shanghai. Our research teams here focus on discovering potential new medicines that meet the unique needs of patients in Asia and driving forward translational science across our core therapy areas.

**Creating vibrant Biohubs**

Stimulating ‘cross-fertilisation’, both between the hub companies and with AstraZeneca, is key to the success of the biohub approach in our evolving sites.

A bold, new R&D initiative to foster life sciences discovery and the exchange of ideas between scientists, our Gatehouse Park BioHub, along with the BioVentureHub at the Gothenburg site in Sweden, and the BioHub at our Alderley Park site in the UK, all have vibrant but distinctive features offering an energising environment, all about sharing ideas and tapping into great science.

“AstraZeneca has been on a transformative journey over the past few years, placing great science at the heart of everything we do in the delivery of breakthrough medicines to patients. Our ambition is to improve the lives of 200 million people by 2025. Such an ambition would not be possible without establishing collaborations of all types with academia and industry. Our biohubs provide a fantastic opportunity to explore collaboration even further.”

Kumar Srinivasan, Head of AstraZeneca R&D Boston and VP Scientific Partnering and Alliances