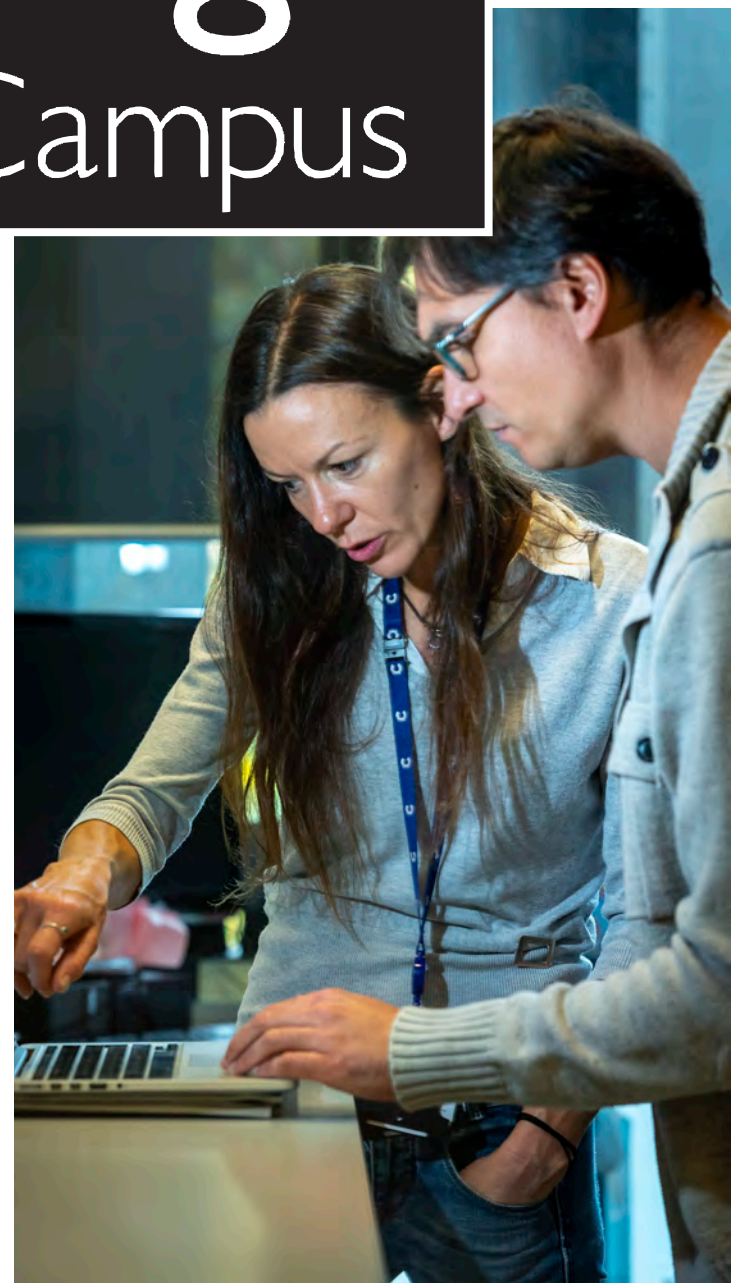


Cambridge Biomedical Campus

*An 8-page special on the
people and the place*



For some it is the place they were born or the place they go for treatment, for others it is the site of their lab desk or the place they will be moving to.

The Cambridge Biomedical Campus means many things to many people but ultimately the campus is for you. It is the place where more than 17,000 people go every day to work to help make people better.

Whether they are doctors or nurses, researchers, technicians or Nobel Prize winners, each of these people make a contribution to those who come to the site to seek answers, treatment and support.

All the organisations on site are based here for a reason – they see the benefits of working together.

Cambridge has succeeded in the last decade because the city has grown to allow ideas to develop and flourish. Being on the campus means companies, academic researchers and clinicians can collaborate to develop the new treatments and techniques which will save lives every day and not just in Cambridge but around the country and the globe.

The site is an important part of the journey for new healthcare treatments, from the early-stage research to clinical trials and finally the implementation of new medicines and techniques in a hospital.

To put it more bluntly the proximity, the skill sets and backgrounds of the likes of the MRC LMB, CRUK Cambridge Institute, AstraZeneca and MedImmune, GSK, the University of Cambridge and NHS trusts all in one place allows for new technology, research and data to be harnessed effectively. Nowhere in the UK and rarely across the world do you find this unique set of conditions.

As an example, there are AstraZeneca researchers working within both the MRC LMB and CRUK Cambridge Institute alongside their staff to develop new treatments and investigate ideas. GSK has a clinical unit embedded in Addenbrooke's Hospital and the University of Cambridge has a number of its academics working in buildings across the site.

The range of areas this research covers forms a broad spectrum from how cells interact to how cancer (in its many forms) develops, to new ways to bring hearts back to life, to investigating the causes of dementia and other mental health issues. This is just to take a brief pin prick into the work going on across the site.

This is why the campus has played such an important role in Cambridge becoming the UK capital of life science. In 2015-16, there were 431 companies working in the sector employing more than 15,000 people across the city. Cambridge files more patents than any city in the UK and we have 20,000 registered companies generating £30bn in revenue.

Our success is based on everyone's willingness to unite to exert a powerful global influence as the campus and the other life science clusters attract world class companies, investment and talent to the area.

However, the campus almost seems to have grown under the radar. The site is still growing, with joint developers Liberty Property Trust and Countryside Properties working to bring new organisations and

What is the Cambridge Biomedical Campus?

Tony Taylorson explains how this fast-growing site in the south of the city is having a fundamental impact for patients – and on the future of healthcare.



An aerial view of Cambridge Biomedical Campus, with the distinctive three-sided new AstraZeneca building at its centre, adjacent to the new Royal Papworth Hospital, which is also under construction

IN NUMBERS

17,250
people working on site

30,000+
will be working on site by 2030

£700million
investment committed to campus over last three years

26,500
visits to the campus every day from patients, staff, academics, scientists and visitors

“
We are now the largest employment site in Cambridge. We have a daily population nearly the equivalent of Ely but on a site which is just 1% of its size
”

opportunities for collaboration to expand the campus to 170 acres in total. Despite investment worth more than £700 million being committed to the site over the past three years it is still often and understandably referred to as the 'hospital site'.

Not that there is anything wrong with this but to demonstrate the sheer scale of the growth, we are now the largest employment site in Cambridge. There are currently

26,500 visits to the campus every day from patients, staff, academics, scientists and visitors. There will be 22,000 people working here by 2021 which will increase to over 30,000 by 2031.

We have a daily population nearly the equivalent of Ely but on a site which is just one per cent of its size. This clearly creates challenges for ourselves and the local community which we are working to address with residents, the Greater Cambridge Partnership and the Combined Authority. Already, nearly two-thirds of the people coming to work on the campus do so via sustainable means such as by bus, cycle or on foot and we are working hard to make more of a difference. For example, as the campus began to expand, an investment of more than £4million was made in the guided busway by the expansion's developers.

There are huge opportunities for us in the next few years but to realise these we must explain properly why the campus is a community which is working to benefit society.

This, in part, is why over the next year we will be providing you with stories in this supplement from across the campus to highlight the extraordinary things which happen here every day.

As a place, a group of organisations and as people, our primary focus is simple: to improve healthcare and find ways to help those who are ill. What better goal can anyone have than that?

On the site

- Abcam
- Addenbrooke's Charitable Trust
- AstraZeneca and MedImmune
- Cancer Research UK Cambridge Institute (CRUK)
- Cambridgeshire and Peterborough NHS Foundation Trust
- Cambridge University Hospitals NHS Foundation Trust
- The NIHR Biomedical Research Centre
- Royal Papworth Hospital NHS Foundation Trust
- The MRC Laboratory of Molecular Biology (MRC LMB)
- Cambridge Academy of Science and Technology
- GSK
- NHS Blood and Transplant
- IdeaSpace
- Long Road Sixth Form College
- The University of Cambridge

School of Clinical Medicine, which includes: five Medical Research Council (MRC) Units, Department of Haematology, Department of Clinical Neuroscience, Department of Medicine, Department of Radiology, Department of Surgery, Department of Medical Genetics, Department of Psychiatry, Institute of Metabolic Sciences, Cambridge Institute for Medical Research, Institute of Public Health, The Milner Therapeutics Institute, Department of Public Health and Primary Care, The Cambridge Institute of Therapeutic Immunology and Infectious Diseases, The Wellcome Trust-MRC Cambridge Stem Cell Institute, Department of Clinical Biochemistry, Department of Oncology, Cambridge Clinical Research Centre and The Healthcare Improvement Studies Institute among others.



A vision of how the campus will look

Stephen Bevan

explores the design of the extraordinary new Royal Papworth Hospital opening in 2019 on Cambridge Biomedical Campus.

Seconds could mean the difference between life and death when it comes to giving treatment to someone who has had a heart attack – that's why the new state-of-the-art Royal Papworth Hospital includes a number of design features to help doctors get care to them sooner.

Although the hospital – which will relocate from Papworth Everard to the Cambridge Biomedical Campus in spring 2019 – does not have an A&E department, as the region's largest heart attack centre it receives hundreds of emergency heart attack cases every year. Patients are rushed in by ambulance so that they can receive Royal Papworth's specialist care, and the quicker paramedics can transfer the patient to the heart attack team, the better the patient's chances are.

Royal Papworth consultant surgeon Steven Tsui, who helped plan the new hospital, said: "With heart attack patients, every second counts, so we have spent hours debating the design of the building to maximise efficiency and ensure no time is lost in treating patients once they arrive at our doors."

To minimise delays, the ambulance delivery bay at the front of the new hospital lines up precisely with two dedicated lifts, to take emergency heart attack patients to the first floor where they will be wheeled straight into a catheter lab for primary percutaneous coronary intervention (PPCI) treatment. The life-saving procedure opens up the heart's blocked artery with a balloon before a stent is put in place to keep the artery open.

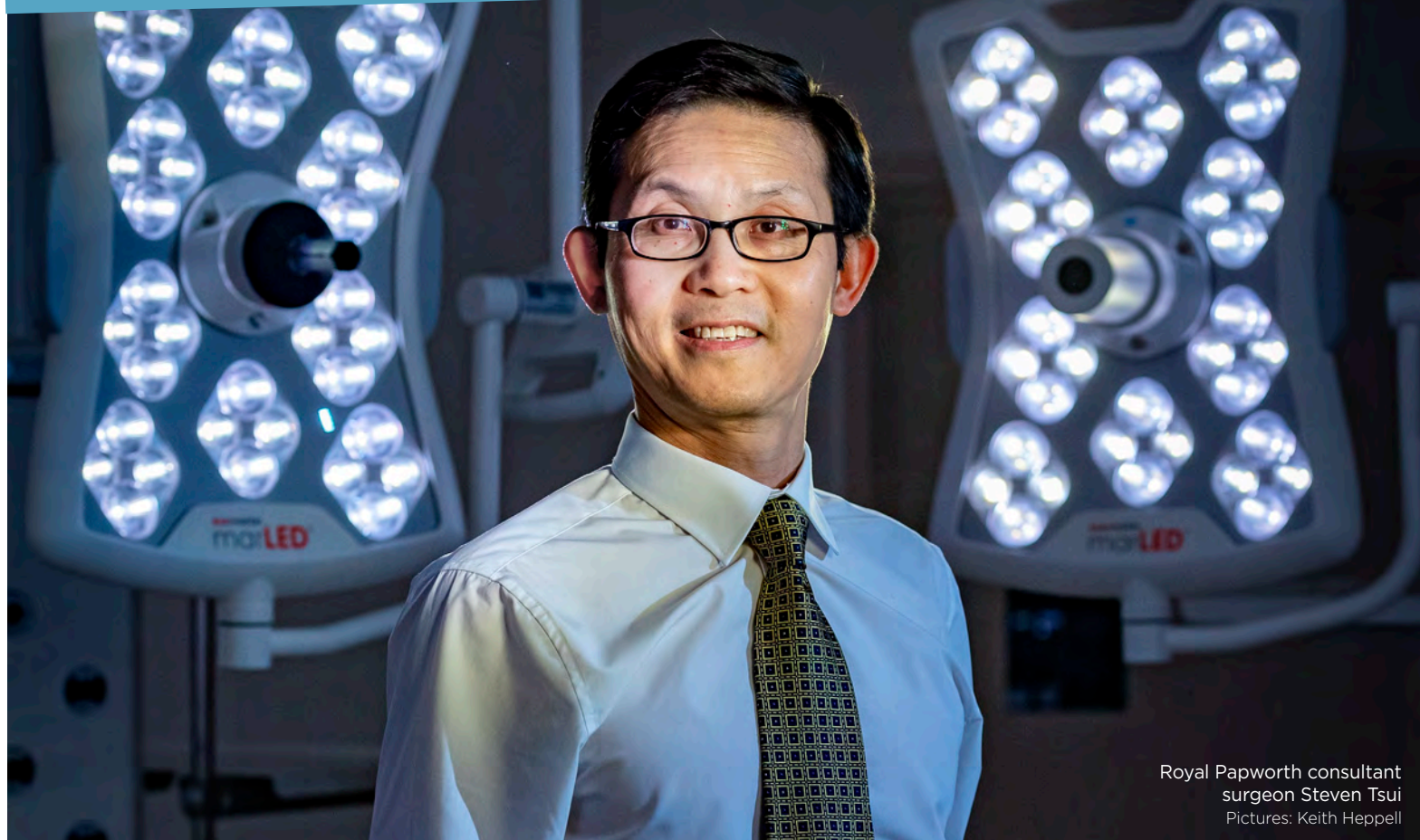
Following PPCI, patients at the new hospital will be transferred to the ward quickly and efficiently, where their recovery can begin. The heart attack team is then ready to receive the next patient.

Another of the design features requested by Mr Tsui was the elimination of sharp corners along the corridors between the hospital's operating rooms and the critical care area, to facilitate the smooth and uninterrupted transfer of patients and equipment. Automated



Steven Thurston

A design for life



Royal Papworth consultant surgeon Steven Tsui
Pictures: Keith Heppell

corridor doors will also open in synch to prevent any hold-ups.

Pillars have been 'designed out' of the critical care patient rooms, meaning medical equipment can be easily manoeuvred and the space could be transformed into an emergency operation room if needed. Huge glass doors offer increased visibility for nursing staff to keep a close watch on the patients.

In addition, there are dedicated lifts that bring visitors directly into the centre of the critical care area, which means that relatives will not have to travel through the main hospital concourse to visit loved ones. Throughout the hospital 'cross-traffic' has been minimised by design to create a calming environment.

"Everything in the hospital is bespoke," said Mr Tsui. "We have futureproofed the design by standardising the footprint and layout of all the main procedural rooms so that they can easily be re-adapted for different purposes as new requirements evolve. With a programme to upgrade with new equipment as it is developed, the hospital will remain operational and modern 50 years from now."

Steven Thurston, a charge nurse in Royal Papworth's cardiology department, believes the new building will make a career at Royal Papworth even more attractive to other nurses.

"We're modernising cardiology for the 21st century – and that's what we should be doing," he said. "We're a leading hospital and the

new building will help showcase the amazing work going on here.

"For a start the building will be more open and streamlined; the rooms will have more daylight. I'm sure new nurses and staff will want to come here; it's going to be very exciting – being a part of a new hospital doesn't happen in many people's careers."

Steven, who had 11 years' experience as a nurse when he arrived at Royal Papworth Hospital last year, said cardiology had appealed to him since his training days in coronary care.

"I remember the first time I saw a heart attack patient – and watching them go from death's door, to having a cup of tea, to going home again in a matter of days. The turnaround is incredible – and that was before the days of PPCI!"

"At Royal Papworth we can get as many as 10 PPCI cases arriving in a shift. These are patients who are in severe pain, cold and clammy.

"They go into the cath lab and have their coronary artery stented and they come back a different person. A couple of days later they're usually ready to go home.

"It's satisfying because you see such a radical change over such a short time."

Steven said working at Royal Papworth was always part of his career plan.

"Royal Papworth is cardiology, and there are many different services within that.

"The heart is so simple and so complex at the same time, that's what I love about this branch of medicine.

"When you learn about cardiology, and about how it all connects, you can talk to the patients and their relatives and help educate them.

"You're involved with the whole process – not just the acute stage of it – so when the patient is leaving the hospital you're making sure they have all the information they need to make informed decisions about the future.

"It's a fast-paced environment. Everyone just loves the job, it is so rewarding.

"There are always interesting cases and the cath lab team and consultants are great at getting you involved and asking your opinion.

"You learn a lot – it's a great team to be a part of."



The new Royal Papworth Hospital on Cambridge Biomedical Campus

New pathway for heart attack patients

In September, Royal Papworth Hospital, the East of England Ambulance Service and other NHS partners launched a new pathway for patients with high-risk NSTEMI (a type of heart attack).

The new rapid NSTEMI pathway sees high-risk patients being transferred immediately to Royal Papworth Hospital for coronary angiography and revascularisation, rather than being admitted to

another hospital first. The new pathway has the potential to save 125 ambulance transfers, 604 occupied bed days and £238,000 for the NHS in the first year, while also providing better outcomes for patients.

The stories of four campus apprentices

The lack of science apprenticeships in the UK has been a source of national gnashing of teeth but in Cambridge and on the Biomedical Campus, companies and organisations are bucking the countrywide trend. **Tony Taylorson** speaks to four apprentices to see what attracted them to their roles and what motivates them for the future.

‘During my A-levels, I became fascinated by genetics and how blood works, and I decided I really wanted to help people affected by cancer. The career I always thought I wanted – to be a physiotherapist – completely changed.”

This is Jade Smith who has just graduated as an apprentice lab technician at Abcam. Having started with the company in October 2016, a career in life sciences now beckons for someone who sees her apprenticeship as an important step in her career.

“I don’t ever remember wanting to go to university – I know it works for some people and a lot of my friends have gone, but for me I wanted the hands-on experience of doing things and learning while I was doing the job.

“I know some people who went off to do a degree and never set foot in a lab for months, while within a few weeks I was on the bench shadowing colleagues before being given responsibility myself. That’s why an apprenticeship has worked for me.

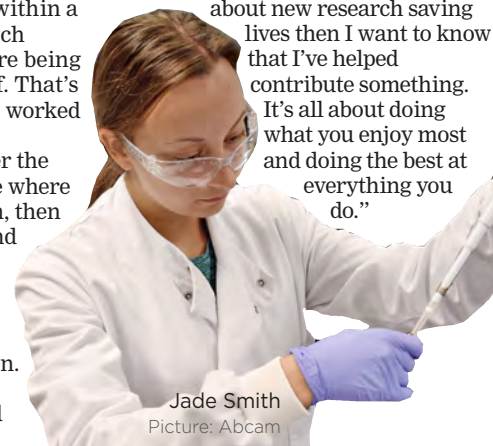
“I’ve had a great split over the last two years on my course where I’ve had four days at Abcam, then a day release for lectures and writing my assignments. This has allowed me to really focus on doing the best that I can on the various tasks I’ve been given.

“This has been helped by all the people I have worked

with at Abcam. I was a bit apprehensive at first, thinking I was going to be at the bottom of the pyramid and looked down on. I was completely wrong. From day one, I was treated no differently from anyone else. There were so many people offering to help and I was soon involved in the company’s project work. There was also a group of apprentices that started at the same time as me working across Abcam in reception, HR, IT and R&D so you never felt alone.

“What’s been great is that when I’ve caught up with my friends who went to study biochemistry, we chat about the similar modules we are doing and they even ask me about the techniques I use every day in the lab. So everything is great and now I’ve finished my apprenticeship, I’m looking to get a masters and continue my work at Abcam.

“I want to be able to say that I’ve helped contribute to cures for cancer – so when you see things on the news about new research saving lives then I want to know that I’ve helped contribute something. It’s all about doing what you enjoy most and doing the best at everything you do.”



Jade Smith
Picture: Abcam

Talking to Fiona Smith, talent development manager at Abcam, you get the sense of how proud they are of Jade.

“People like Jade are just great. She’s recently won the National Apprenticeship of the Year Regional Final for the East of England which is fantastic recognition for all she has achieved. She is also a good reflection of the strategy we have developed at Abcam which is to invest now and develop the skills we need to grow Abcam.

“We are looking for great talent, wherever it might be found – in schools, colleges, inside our organisation and supply chain, wherever people might be who are interested and excited by science and other areas of our business. Having those skills here to support the growth of our business is critical. They help our customers to discover more, faster.

“The modern apprentice is a very exciting person to be around. We encourage them to have new ideas, to push themselves and not be afraid of failure.

“Apprentices are helping us all develop at Abcam and, as Jade shows, what you want to do can change as you grow older, so don’t worry if you weren’t in a science club when you were young. We want people who will ask questions based on curiosity and passion for what they are doing and have a willingness to learn.”

■ To find out more, visit careers.abcam.com.



Ninette Quinton is a healthcare assistant and second year student nurse at Cambridge University Hospitals
Picture: Keith Heppell

Get In2Science

In2Science is an award-winning charity founded by research scientists with the mission to help young people from under-represented backgrounds progress to science degrees and into professions through the provision of work placements and careers guidance.
The programme has enabled 75 per cent of participants to progress to university. Abcam’s involvement with In2Science began in 2016 and continues, with the launch of the Abcam In2Science Scholars programme, where five secondary school students joined a year-long educational programme based in Cambridge.

■ For more information visit <http://in2scienceuk.org/>.

Paige and Dan join AstraZeneca and MedImmune

Over at AstraZeneca’s IMED Biotech Unit, Paige Orwig and Dan Rhodes have taken different routes into their apprenticeship schemes but are clear they made the right choices.

Dan works in the analytical and structural chemistry group, which uses cutting-edge techniques to assess the purity, stability and chemical structure of novel drug molecules.

“Before joining AstraZeneca, I was studying chemistry, maths, and physics subjects at A-level. Initially I assumed that I would go to university to study full time, but as I entered the upper sixth I decided that what I really wanted to do was to combine working with studying.

“What excited me about an apprenticeship was the possibility of getting real experience of laboratory research while continuing to learn and develop academically.

“It takes three years to study as an apprentice for a foundation degree at AstraZeneca, as well as a further two years to gain an honours degree. So that’s five years in total, but the opportunity of working alongside scientific experts and contributing to the development of the next generation of oncology medicines during this time is incredible.

“This is not to say things have been easy. Coming straight from sixth form, I found myself surrounded by scientists with many more years’ experience and much more scientific knowledge than me. It was a very steep learning curve but gradually, as I learnt the science behind the technical terms and gained in experience, I became more confident in my ability to contribute

independently to the scientific research projects.

“The science job market is competitive, and the experience I will gain here will give me a huge advantage as I develop my career. There is a growing awareness that good quality apprenticeships which combine the opportunity to study towards a degree with practical lab-based learning opportunities are a great opportunity.”

Paige’s journey, on the other hand, demonstrates an apprenticeship is not something you have to decide on at the beginning of your career.

“I work for DMPK, which stands for drug metabolism and pharmacokinetics. We look at how a drug is absorbed through key barriers such as the gastrointestinal tract, how it is distributed around the body, how it is broken down by the body (does it form anything that could be reactive) and the route it takes to leave the body.

“I suppose the difference between Dan and I is that I’m a mature apprentice. I’m originally from the States and did my high school qualifications and undergraduate degree there, before taking a master’s in Russian and Eastern European Studies at the University of Birmingham. It wasn’t until after my master’s that I decided I wanted to work as a scientist, so I went back and did A-levels in chemistry and biology but it had been about ten years since I’d touched a science subject.

“When I decided I wanted to go into a science career, I was already in debt from my master’s degree, and I couldn’t afford another degree so I had to find another route.

“The apprenticeship is such a wonderful qualification, you actually get to go in a lab, and you have so much support around you from your colleagues. At university you might get one lab practical a week, whereas as an apprentice in a pharmaceutical company, you have access to the lab all the time, along with all the kit, the experienced colleagues, and the environment you wouldn’t have access to at university. It really prepares you for the world after university.

“As an apprentice, you’re working alongside people who’ve not only studied at university, but have years of industry experience. You benefit from working with all these knowledgeable colleagues who are willing to talk to you, and work through challenges with you.

“Being in Cambridge is a fantastic opportunity too. There is much innovative science going on, particularly at the Biomedical Campus where you’re really at the heart of the science, especially in oncology.

“There’s so much collaboration available in Cambridge. I often work at the Cancer Research UK Cambridge Institute building on the campus with my bioscience colleagues. This allows me to learn about other areas of the business and learn from colleagues with different areas of expertise. I have also met other scientists working in oncology and have discovered that Cambridge yields itself really well to this kind of collaboration within a company, with the university and across the pharmaceutical industry.”

■ If you are interested in applying for an apprenticeship at AstraZeneca then visit careers.astrazeneca.com/students.



Dan Rhodes and Paige Orwig
Picture: Keith Heppell

Study while working towards registered nurse status

Cambridge University Hospitals (CUH) is seeking to employ individuals as healthcare support workers (HCSW) while on a journey to become a registered nurse, leading to registration with the Nursing & Midwifery Council (NMC). It is seeking to employ individuals with excellent interpersonal skills who have the passion to care for our patients while working as part of a team.

The Nursing Apprenticeship Pathway lets you study part-time at university while employed at CUH (Addenbrooke’s Hospital), as a healthcare support worker – ultimately progressing to registered nurse status. You get

the best of both worlds!

As a healthcare support worker/nursing apprentice you will:

- gain the ability to earn while you learn
- receive a route into nursing with tuition fees to the value of £27,000 paid by CUH leading to a BSc (Hons) nursing degree (upon meeting university and CUH eligibility criteria)
- access higher education while gaining valuable experience in the workplace
- be on a structured career pathway that could see you working in one of the most vibrant, innovative and exciting NHS trusts in the country

- be employed in a permanent HCSW position with progression to registered nurse status
- receive pastoral support throughout your pathway
- receive a range of employee and student benefits.

Maybe you are considering a career change but worry about accumulating significant student debt. The Nursing Apprenticeship Pathway is a fantastic opportunity to develop the skills needed to force a rewarding career.

■ If you are interested in learning more, contact the nursing apprenticeship team via nursingapprenticeship@addenbrookes.nhs.uk

Healthcare assistant and student nurse Ninette says her self-belief has grown so much

Being an apprentice on the Biomedical Campus doesn’t just mean working in a lab as Ninette Quinton, a Band 2 healthcare assistant (HCA) and second year student nurse at Cambridge University Hospitals, explains.

“When I was at school, I wanted to do medicine at university but if I’m honest I lost my motivation so decided to take a year out. I took a job as a healthcare assistant (HCA) at the

hospital while I decided what I wanted to do and ended up finding my calling. I discovered I loved nursing.

“So I enrolled on the Nursing Apprenticeship Pathway which means I spend half my week as an HCA responsible for basic care needs, like observations and helping patients.

“The rest of the time I’m a student nurse working with a mentor to help with drug

rounds, care plans and going on placements.

“I’ve had some great experiences from going into the plastic unit, as well as my ‘home’ J2 major trauma ward where I’ve learnt so much from so many people.

“Trying to balance being an HCA, a student nurse and my studies on the Anglia Ruskin University BSc nursing degree programme isn’t easy but I’m

doing it. I’ve learnt a lot about myself – I never expected to be able to organise all the jobs in my head as it can feel like there are a million things to do, but I’ve impressed myself by taking responsibility.

“My self-belief has grown too from pretty much having none before.

“I’ve got a year left on my course and have made good friends with all the people who

joined with me – we’ve all kind of stuck together which has been really nice.

“As I say, I love what I’m doing now and in the long term I want to work up the bands to become a specialist nurse and do the best I can.

“Being an apprentice is a lot different to what I thought it would be but if anyone wants my advice, I’d say just go for it really.”

Personalising treatment for breast cancer patients

Catharine Scott was one of the first patients to take part in the Personalised Breast Cancer Programme (PBCP) - a pioneering Cambridge study which reads DNA and RNA information like a barcode to tailor treatment for breast cancer patients at Addenbrooke's Hospital.

Catharine led as normal a life as anyone can - happily living in Cambridge with her husband Andrew and two children, Chris, 23, and Lucy, 18. But in September 2016, things changed as Catharine was diagnosed with breast cancer. "I first realised there was a potential problem in August when I was on holiday. It felt like there was a pain near my ribs, I thought I'd done something at the gym or carrying the suitcases on holiday. There wasn't a lump as such but it didn't feel right. I went to see my GP when I got back and he referred me straight away to the breast unit. "It all came as a real shock. The previous November I'd had a mammogram as part of the early call up programme, that came back all clear so I thought this couldn't be anything serious, but it was quite a significant tumour. I

thought it should've been picked up at the mammogram but they showed me my scan - there was nothing there, it was completely clear. The tumour was fast growing, it was 4.9cm and grade 3, so a lot had happened in a few months. "My family coped with it very well but it was a big shock to begin with. My children responded differently, my son was quiet and thinking it through, my daughter was very upset and crying. My mum and sister were very upset as well. I think it's harder for other people, I had to get on with it and deal with it. People told me I had been strong and positive, but really, what else can you do? "My husband Andrew was very supportive throughout the whole process. He attended virtually every appointment right from the very first tests in the Breast Clinic, up to my operation, including most

of the chemo sessions, consultations, two blood transfusions and so on. If he couldn't attend chemo because of work commitments, then either my mum or Lucy came with me. I was never on my own." Leading the genomic revolution, Catharine's consultant was Dr Jean Abraham who co-leads the Personalised Breast Cancer Programme. Over 350 patients from Addenbrooke's Breast Cancer Unit have already taken part, becoming some of the first NHS breast cancer patients to have whole genome sequencing of their tumour as part of their routine treatment.

For every patient on the programme, the DNA and RNA readouts from their tumour cells are compared with those of their healthy cells to study which genetic mistakes are causing the disease and which weaknesses could be targeted with cancer drugs.

The Personalised Breast Cancer Programme builds on ten years of research led by Professor Carlos Caldas, which discovered that breast cancer has at least

ten different genetic subtypes. Each subtype has a distinctive genetic and molecular fingerprint and each has different weak spots which can be targeted.

The genetic 'barcoding' of

Catharine's tumour confirmed that she was on the best available treatment plan. It also revealed that Catharine's cancer was not hereditary, therefore the genes that caused her cancer would not be passed onto her children.

Catharine said: "I had always thought breast cancer was breast cancer. I hadn't realised there were different types. That's why the research into personalised medicine works because they can treat you more effectively. It was a relief to realise.

"After signing up for the programme, I also found out that I was eligible for a trial called PARTNER. I was given the chemo that I needed but I also tried a new drug as well. I didn't need to have a mastectomy because the tumour had shrunk enough during treatment, from 4.9cms it had almost shrunk to nothing.

"This definitely opened my eyes to the importance of research, it's inspiring when you see it and are involved in it. Somewhere there is a bit of my body being used for research. I had extra biopsies for research. It is strange to think these samples are being kept or used but, if it's helping, that is great. If you are going through something like this, you do want to help others. If it can help in the future, that is a good thing. Research is expensive but certainly worthwhile."

Dr Francesca Nice, at the Cancer Molecular Diagnostics Lab, loading plasma samples for the extraction of circulating tumour DNA
Picture: Keith Heppell



Obtaining accurate results within a 12-week timeframe for each patient on the Personalised Breast Cancer Programme is essential to determine the best course of treatment, and this is only possible through many campus partners working closely together.

Cancer Molecular Diagnostics Lab: The blood and tumour samples from patients on the Personalised Breast Cancer Programme are processed here by research scientists such as Dr Francesca Nice, pictured left. Genetic material is extracted from the tumour cells ready to send to Illumina for the DNA and RNA readouts.



Cancer Research UK Cambridge Institute: Professor Carlos Caldas, centre, Dr Maurizio Callari, left, and Raquel Manzano analyse the results of the DNA and RNA readouts.

Professor Carlos Caldas, overall programme lead and director of the Breast Cancer Programme at the CRUK Cambridge Centre, said: "Over 30 years ago we thought breast cancer was one disease, we now know it is different types and requires different treatments. This ability to sequence the genetic information of a patient's cancer allows us to discover more of the secrets of the cancer and how it behaves.

"The parallel work we are doing on drug development allows us to test more compounds and to speed up the process. At the moment, experimental drugs are only used in patients with advanced stage cancer, we need to change this so we can see how these drugs would help patients who could potentially still be cured. The work we do is allowing us to move towards that."



Dr Alejandra Bruna and Dr Oscar Rueda are research scientists in Professor Caldas' lab at the Cancer Research UK Cambridge Institute



Addenbrooke's Breast Unit: Research nurse Justine Kane packages up blood and tumour samples from a patient to be sent for processing.

Illumina: The genetic samples are sent by courier, off the campus to Illumina, which is based in Chesterford Research Park. Banks of sequencing machines churn out the genetic code that characterises each patient's tumour.

Dr Jean Abraham, Addenbrooke's Breast Unit, discusses the results with her patients and decides on the best course of treatment for their particular type of cancer.

Dr Abraham said: "The beauty of the sequencing project is that we are getting the data faster and can react. We have done this before for research purposes but it can take many months. This isn't as meaningful for patients - we wanted to have an impact now. We have reduced the timescale to 12 weeks. In fact, on average it is more like six-nine weeks from receiving the sample to returning the result to the patient in clinic.

"The benefits are various and depend on the stage. If it is advanced stage, the findings that we get from the whole genome, that genetic information might push us towards a different treatment, or you might find a specific mutation which means they could take a certain clinical trial.

"A lot of patients will not see their treatment plan change but it might offer hope if there is a relapse. We will have a better idea of what to do at that stage, it becomes an armoury of knowledge. We know the weakness that we can target. That is a comfort to them. In addition, knowing that you don't carry any high risk hereditary genes is reassuring to both the patient and their family."



Charities behind pioneering programme

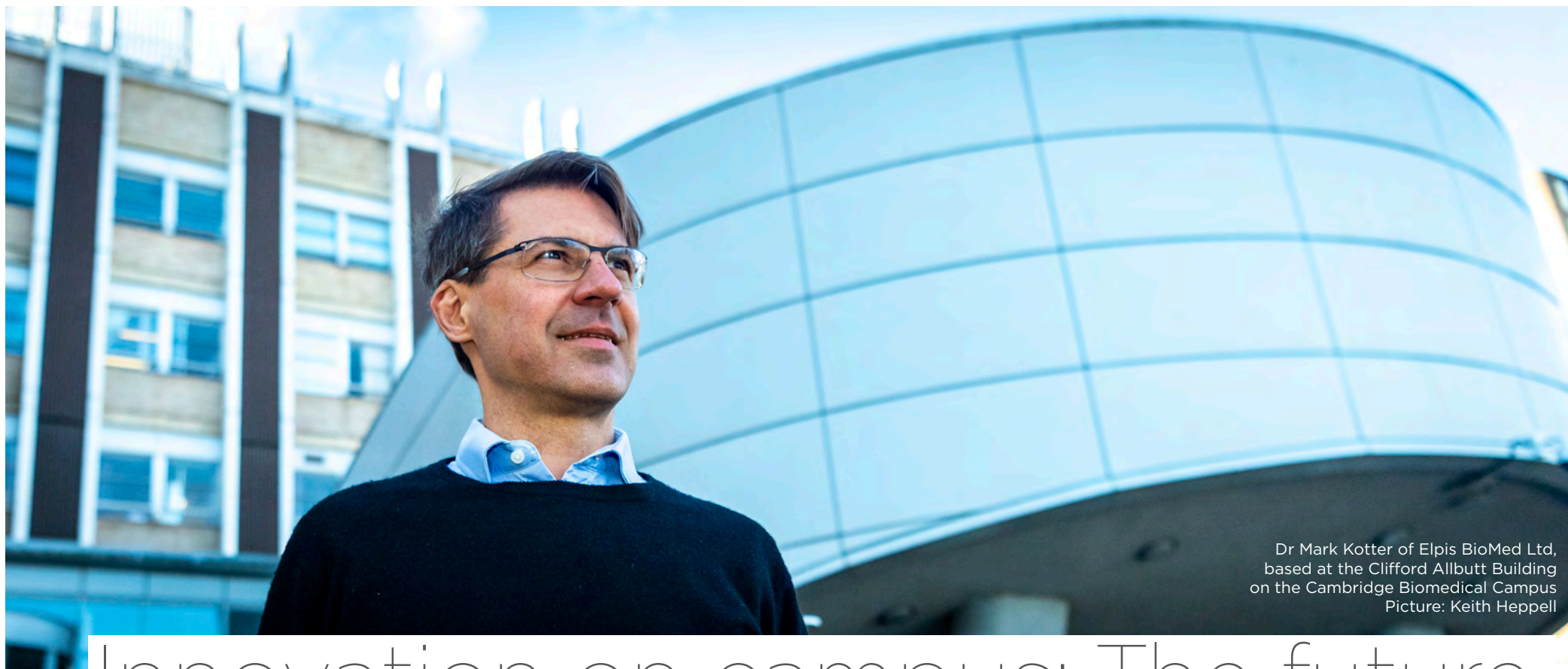
Fundraising by Addenbrooke's Charitable Trust's Bracode Campaign enabled the Personalised Breast Cancer Programme to be piloted on the first 250 patients.

Following the success of this phase, the Programme is now being rolled out to a further 2,000 patients with funding from Cancer Research UK and The Mark Foundation for Cancer Research.

Dr Jenny Longmore, director of research at Addenbrooke's Charitable Trust (ACT), said: "ACT is pleased to have been able to support the pilot stage of this clinical research project with more than £1.1 million of funding from many generous supporters demonstrating the feasibility of using this approach and using the power of genomics in a real-life clinical setting."



Catharine Scott



Dr Mark Kotter of Elpis BioMed Ltd, based at the Clifford Allbutt Building on the Cambridge Biomedical Campus
Picture: Keith Heppell

Innovation on campus: The future of human cell production is here

Elpis BioMed is breaking new ground in personalised medicines, as **Amy Flower** discovers.

Downstairs in the Clifford Allbutt Building some extraordinary developments are taking place. ideaSpace, a community of founders and entrepreneurs, is home to a spin-out of the University of Cambridge, Elpis BioMed Ltd – an organisation tipped for global success in the push for personalised medicines.

As Dr Mark Kotter, scientific founder of Elpis BioMed, explains: “Using our direct cell reprogramming platform, we have a technology that enables stem cells to be changed into any other cell type, producing pure, mature and consistent batches of human cells in a way that has never been done before.”

Previous methods for generating

human cells have proved to be technically challenging, resulting in inconsistencies and poor scalability, and not without ethical concerns. Consequently, research and drug discovery is still mainly based on animal research or cells derived from tumours, and progress in cell therapy remains slow.

“We believe we have solved this problem by using our disruptive technology to create 100 per cent pure and reliable human cells, which has resulted in huge benefits for drug discovery, biomedical research, cell therapy and toxicology. Our technology is currently used by the Sanger Centre as part of the Open Target Project, in order to identify targets for future dementia drugs,” says Mark.

The company has secured

“*The rich environment on campus is something that is unparalleled*”

Dr Mark Kotter

financial backing from a team of world-class investors including industry expert and lead investor Jonathan Milner, VC and major donor Weslie Janeway, and renowned entrepreneur Darrin Disley.

Elpis technology was developed in Mark’s laboratory at the University of Cambridge and exclusively licensed to Elpis. Together with Dr Gordana Apic, a serial entrepreneur in life science businesses, they head up a team of scientists and business experts, passionate about high-quality research and taking human cell culture to the next level.

As Mark explains, the Cambridge Biomedical Campus is a hive of world changing activity.

“The rich environment on campus is something that is unparalleled. To physically be where the experts are and be able to meet up regularly with our collaborators is vital to the development of our research and our business. Also, being embedded with other start-ups that promise to have a real future impact is a real plus.”

Elpis is now actively encouraging partnerships and joint ventures for generating novel cell types, joint product offerings in the form of 3D or organ-on-chip systems based on Elpis’ cells, and developing its cells for future therapeutic and personalised medicine approaches.

As Mark continues: “One of the unique properties of our technology is its scalability. Over the next 24 months, we will expand our product offerings to human cells with distinct genetic backgrounds, for example from healthy and patient donors, as well as provide bespoke cells with synthetic mutations or gene insertions that meet specific research requirements.”

■ To find out more about Elpis and ideaSpace visit elpisbiomed.com and ideaspace.cam.ac.uk.

‘Start-up business success has me basking like a very proud parent’

“I never thought for a second that the science behind Heptares was a risk – myself and Richard Henderson always knew it would work, but when we sat down to discuss what to do with our discovery, starting our own company was the last option on a list of three. So what changed our minds – why did two people who were (and still are) very happy as academics decide to do something completely different?”

“It was the interest, expertise and passion that Malcolm Weir and Fiona Marshall, our fellow

Chris Tate from the MRC Laboratory of Molecular Biology and one of the founders of the pioneering drug discovery company, Heptares, gives his insight on what is needed to successfully start up a company.

co-founders and long-term supporters of our research while they were in the pharmaceutical industry, which made Heptares a reality. It was the strong bonds of trust and respect that held the four of us together through the investment meetings, renting our first building, developing our

projects, through to our eleventh anniversary this year.

“Our skills and knowledge of areas perfectly balanced each other. We drew boundaries between the company and our academic research, we carefully chose a board that could help develop the firm and, importantly, Heptares evolved as new

science developed. The common mistake a start-up can have is that it focuses on an initial idea above all other things while the founder and their industry backers fall out over direction or a failure to appreciate each other’s expertise. We knew to succeed we had to keep on top of the market, which through

our advisory board we achieved.

“I look at the success of Heptares now and feel the way a parent basks in the joy of their child leaving home and going off to do great things in the world. The day when drugs developed by the company hit the market will undoubtedly be the crowning point of my career – achieved through trust, respect, knowledge and great science.”

■ Heptares is now a wholly owned subsidiary of Sosei.