King's college hospital charity

Pioneering care today, hope for tomorrow

Pursuing excellence in liver care and research

King's College Hospital Charity and the Institute of Liver Studies:

advancing liver care through research and innovation

King’s College Hospital Charity is proud to support the groundbreaking work of the Institute of Liver Studies, a leading centre of research, development and innovation.

The Institute is based at King’s College Hospital in London, which is globally renowned for the management of liver diseases of all causes. The hospital’s liver department is the largest hepatology centre in Europe and provides innovative and comprehensive diagnostic and therapeutic treatments. With 3,500 new referrals each year, its life-saving work never stops – even when faced with the unprecedented challenges of the COVID-19 pandemic. In 2020/21, King’s surgeons carried out 270 adult liver transplants, surpassing their pre-pandemic figures.

Widely acclaimed for their expertise in acute liver failure, chronic liver disease, liver cancer, viral hepatitis, liver fibrosis and immunology research, King’s clinicians and researchers are dedicated to improving the care and outcomes for the thousands of liver patients they serve each year.

For over fifty years, King’s has been at the forefront of pioneering surgery, treatment and research. We are proud to share with you some of the ongoing research and development projects led by Professor Nigel

Heaton, leading Consultant Surgeon in Liver Transplant and Hepatobiliary and Pancreatic (HPB) Surgery.

Many of these breakthroughs and innovations have only been made possible through the generosity of the Charity's individual supporters and grant-giving organisations over the last five years. Their valued support has helped us advance the Institute's vital work, providing funding for research, equipment and projects that go above and beyond what the NHS is able to provide. Whether it is funding a perfusion machine to ensure a greater number of donated livers are viable for transplantation or supporting the next generation of groundbreaking liver research, their generosity has given patients life-changing care today and hope for tomorrow.

King's College Hospital Charity and all our NHS colleagues are indebted to the philanthropists who had the vision to invest in new ideas and practices. They, in partnership with some of the world's leading experts in liver disease, are helping transform care and treatment for patients.

So much has been accomplished in the last five years. We hope you are inspired and excited at the prospect of what can be achieved over the next five years.

World leaders since 1966

1966
The Liver Unit at King's is established

1968
First liver transplant in the King's programme

1971
Construction of the first liver laboratories at King's

1982
First liver transplant for acute liver failure

1991
First split liver transplantation in the UK

1993
First adult-to-child liver-related transplant and first auxiliary liver transplant

2000

King's consultant successfully grafts a liver in a five-day-old baby, the world's youngest transplant patient

2001

The UK's first liver donation after circulatory death programme is established at King's

2014

First in-man normothermic machine perfusion of a liver for transplant

2017

First live donor combined liver and small bowel transplant in Europe

2020

6000th liver transplant at King's

Professor Nigel Heaton:

a lifetime dedicated to liver care

In a career spanning over forty years, Professor Nigel Heaton, Consultant Surgeon in Liver Transplant and Hepatobiliary and Pancreatic (HPB) Surgery, has helped develop some of the world's firsts in treatments for liver disease, such as split liver transplantation and living donor liver transplantation.

Professor Heaton began his medical training at King's in 1973 and witnessed his first liver transplant just three years later. When the transplant programme was established at King's in 1989, he devoted himself fully to liver surgery – and has done ever since.

“The first decade of my career was a time of huge surgical innovation and King’s was at the forefront of those developments,” says Professor Heaton.

“Thirty years on and our transplant programme is now quite mature. We perform, on average, over 250 liver transplants a year, typically four or five a week. It has become a common procedure and moved from something that was considered unusual to being very much part of the accepted treatment for patients with liver disease and liver failure.

“We now use technology to our advantage, particularly to try to improve donor livers on their journey through the transplant process. It is our aim to avoid early dysfunction and, hopefully, continue to improve patient outcomes. Currently, studies on machine perfusion – keeping the donated liver alive on an artificial circuit – are being carried out to assess the type of perfusion, the temperature at which it is carried out, and whether blood or an artificial solution is used. Our intention is to help develop these technologies at King’s and use them to define and improve their place in clinical practice.

“When the liver works well, it can transform the health of the recipient rapidly. It still amazes me that someone can be close to dying but just a day after surgery they can be having a cup of tea and talking to you – and then, within ten days, they can be out of hospital. It is an extraordinary thing to see.”

Liver transplantation: addressing the growing gap between supply and demand

The most significant problem facing liver transplantation today is the global shortage of organs available for transplant. Often, those that are available are suboptimal and carry a high risk of complication and impaired function, which can result in the death of the patient.

In May 2020, organ donation law in England changed to an opt-out system and many are hopeful that this new legislation will help address the shortages. As yet, it is too early to establish whether it has made a significant difference because of the negative impact of the COVID-19 pandemic on organ donation and transplantation. The lack of intensive care beds, coupled with the possibility of COVID-19 infection in donors, added to the potential risks of transplantation. However, Professor Heaton believes that the new legislation may have helped sustain numbers, ensuring King's was able to avoid the worst of the downturn in donations.

While the new legislation continues to take effect, he and his colleagues are working to address the key concerns of supply and quality. "Innovation has changed its focus from surgical technique to improving organ supply," he says. "We are attempting to solve the problem of managing demand and find an increasing number of organs that will work reliably and deliver good outcomes."

The step towards a solution

Machine perfusion may help bridge the gap between supply and demand. It is an innovation being advanced at King's thanks to the generosity of King's College Hospital Charity supporters, some of whom have received a life-saving liver transplant. "This recent introduction has been a paradigm shift in liver preservation and liver transplantation," says Professor Heaton, "and King's has spearheaded many innovations such as this."

He and his colleagues were involved in the first randomised trial to compare normothermic machine perfusion (NMP), which is the pre-transplant storage and preservation of the liver using fluids at body temperature, with conventional static cold storage. Their findings showed that the livers that had undergone NMP before transplantation showed significantly less transplant-related injury, which is a marker of long-term transplanted organ survival. "That proof of concept has led to NMP being accepted as part of the management of organs after they have been retrieved from donors," says Professor Heaton.

More recently, King's has been involved with hypothermic machine perfusion (HMP): perfusing livers at a much cooler temperature, using oxygen at low levels to try to resuscitate organs and ensure full function when they are transplanted. Thanks to a supporter's generous donation, King's was able to buy its first perfusion machine. To date, over forty transplants have taken place using this machine and King's has been able to start its vital HMP research.

The purchase of the liver perfusion machine also led to King's involvement in two incredibly exciting clinical trials, coordinated in the Netherlands and Switzerland. The trials, which have the potential to change the face of liver

transplantation, compared HMP with the traditional static cold storage method. The aim was to analyse whether this form of machine perfusion improved liver function and survival and, importantly, whether it allowed transplant teams across the globe to use more marginal livers that would otherwise have been discarded. The results confirmed that HMP was a very beneficial way of managing these organs and will expand the potential pool of donors. The findings, which were published in the *New England Journal of Medicine*, may well be considered routine clinical care in the future.

Professor Heaton and his colleagues believe that machine perfusion will play a significant role in routine liver transplantation, for the benefit of patients with end-stage liver disease and cancer.

Hypothermic machine perfusion (HMP)

HMP is an alternative method to traditional static cold storage. It preserves the liver prior to transplant by using a machine to pump oxygenated fluid below body temperature through the liver to replenish energy stores.

Normothermic machine perfusion (NMP)

NMP uses a machine to pump oxygenated blood, medication and nutrients at body temperature through the liver before transplantation. This enables the surgical team to assess liver function before surgery takes place.

Researchers at King's are working to prove that these methods can improve early liver function, reduce rejection rates and increase the lifespan of transplanted livers. Critically, these techniques could make more marginal livers usable, which will dramatically reduce the transplant waiting list.

The benefits of machine perfusion and mesenchymal stem cell therapy

The prevalence of suboptimal organs available for transplant is a significant issue: these organs can be found to be impaired after transplantation when the blood supply returns to the tissue. A suboptimal liver – from someone who has hypertension or diabetes, or who may smoke or drink more than they should – may function adequately in the donor. However, this function is greatly reduced when the organ is put under stress at the point of death and then again during the process of transplantation.

Machine perfusion can reduce the severity of this type of ischemia reperfusion injury. In addition, the introduction of mesenchymal stem cells (MSCs) could help reduce inflammation in injured livers and prevent the recipient's immune system from attacking the transplanted organ, further reducing the risk of liver failure or rejection.

Following his successful liver transplant at King's by Miriam Cortes-Cerisuelo, Consultant Surgeon in Adult and Paediatric Liver Transplant and HPB Surgery, Ralph Smith pledged funding to support a three-year project to test the impact of the introduction of MSCs to liver tissue during machine perfusion. Under Miriam's supervision, PhD student Marwa Elgosbi hopes the results of her investigation could help transplanted livers last longer and make many more marginal livers, which otherwise may have been discarded, suitable for transplant. She says, "This project highlights the difficulties caused by of the lack of suitable liver donors and the challenges of trying to improve the quality of damaged or marginal livers."

“We hope to apply MSC therapy during machine perfusion to clinical practice for marginal livers to help them work better, minimise the risk of complications and ensure better outcomes for the patient.”

Miriam Cortes-Cerisuelo

Consultant Surgeon in Adult and Paediatric Liver Transplant and HPB Surgery

I consider myself to be extremely fortunate that I am part of the liver transplantation research team and able to contribute to the understanding of the role of machine perfusion and stem cell therapy in liver transplantation.”

Marwa Elgosbi
PhD student

Marwa began her research in January 2020 and has now built a small circuit that simulates normothermic machine perfusion (NMP). She is currently testing different qualities of liver tissue to track all the anti-inflammatory, pro-inflammatory and immunological responses that occur during perfusion. This will involve studying the genes, proteins and cell types that are activated.

The next stage will be to start infusing MSCs into different liver tissue samples to assess how they act once inside the liver. For example, Marwa will study their distribution and investigate whether MSCs that have been specially designed to break and empty their contents have a more significant effect on liver tissue than MSCs that stay intact. In order to compare and contrast results – and hopefully establish the best option that can be applied to the whole organ – Marwa also plans to repeat these tests on liver tissue samples that have undergone HMP. Towards the end of her research, she hopes to test her findings on whole liver samples, perfusing them on full-sized perfusion machines.

This study aims to prove that the use of MSC therapy during perfusion could help reduce inflammation in injured livers and possibly inhibit any immune reaction to the donor organ, thus improving patient outcomes after transplantation.

Ralph Smith: from patient to donor

First diagnosed with non-alcoholic fatty liver disease, Ralph Smith had been a patient at King's for more than ten years when doctors made him aware that his condition could lead to the development of liver cancer. When this prognosis was confirmed in 2016, a transplant became the only long-term solution.

"Everything went well and I was home after only ten days. King's undoubtedly saved my life," says Ralph.

He decided to use some of the proceeds from the sale of his successful electronic engineering business to fund critical research that could save countless lives. PhD student Marwa Elgosbi is now working to help solve the issue of organ shortage by improving the quality of damaged organs.

Ralph is delighted with the progress she has made, "It's an exciting project with so much potential and I am following Marwa's work with great interest."

In 2021, Ralph made a further generous donation to fund two analysers to help Marwa monitor the performance of the liver while it is in the perfusion machine, measuring characteristics such as glucose and lactate levels before and after the introduction of MSCs.

Marwa has hypothesised that the therapeutic combination of perfusion and the introduction of MSCs will reduce inflammation in injured livers and therefore lead to improved outcomes after transplantation.

Unravelling the complexities of liver cancer

Over the course of his career, Professor Heaton has seen the development of effective treatments for many causes of liver disease, such as hepatitis B and C. However, some of these patients will go on to develop liver cancer as it is a complication of all forms of chronic liver disease.

“In the same way that machine perfusion has become a paradigm shift, liver cancer is becoming perhaps the primary indication for transplantation,” says Professor Heaton. “We are becoming much more of a cancer-based service and perhaps up to 40 percent of patients are now being transplanted for cancer. We look after about 20 percent of primary liver cancer patients in the UK and we want to stay at the forefront of that.”

He believes that the key to understanding liver disease and improving patient outcomes is a robust research programme. Clinical studies and research programmes answer questions, evaluate existing care and plug gaps in knowledge, transforming ideas and theories into tangible healthcare benefits for patients and clinicians. Without research, the development of new medical procedures and treatments would not be possible.

“We currently have a number of teams with research interests, many funded through King’s College Hospital Charity,” says Professor Heaton. “I was delighted when the Charity was able to secure further significant philanthropic investment to enable three PhD students to work on complementary liver cancer studies.”

Under the guidance of Consultant Liver Transplant Surgeon and Senior Lecturer Shirin Elizabeth Khorsandi, Robert Nkwo, Megan Illingworth and Roger Fontana are conducting research to better understand the mechanisms of liver cancer, find more accurate ways of predicting disease outcomes, and help devise personalised treatments for patients.

“I really hope all the work the students are doing will lead to King’s establishing a primary liver cancer computational pipeline that will become part of patient clinical care. That’s the aspiration, the dream – that it becomes standardised. You take the tissue sample, you do the detailed molecular characterisation, you put it through an algorithm and then you see what the treatment recommendations are.”

Shirin Elizabeth Khorsandi
Consultant Liver Transplant Surgeon and Senior Lecturer

Using artificial intelligence to target hepatocellular carcinoma

Funds raised by the late Mark Thornberry, King's patient and Charity supporter, is supporting Robert Nkwo's research into hepatocellular carcinoma (HCC), the most common form of primary liver cancer. After being diagnosed with HCC, Mark wanted to fund unique research that would improve outcomes for future liver cancer patients. Robert's project aims to improve the management and treatment of HCC with the aid of computers and biological data.

Computational biology uses computers to uncover large-scale problems in biology and medicine. Robert is using cutting-edge machine-learning models to examine the disease at a molecular level. Using public and King's patients proteomic data sets from liver cancer tissue, he is developing different computational models of HCC. By creating computational algorithms and applying these different machine-learning models to biological data, such as DNA, RNA and proteins, he hopes to answer many questions about the disease.

One of his models looks at predicting survival rates of patients with primary liver cancer. Generally, clinical variables are used to predict these outcomes but Robert has discovered that certain protein groupings appear to be better predictors of whether or not a patient is going to be a long-term survivor.

As part of his three-year-project, Robert is trying to develop new algorithms that could eventually be used to devise patient-specific treatments. By learning which genes and proteins drive HCC, it is possible to uncover new drug targets for treatment. He aims to examine the energy sites in proteins (phosphorylation) to gain a better understanding

> **My research focuses on improving primary cancer liver treatment. It is my objective to use large amounts of biological data from patients to identify new therapies for patients with HCC. Uncovering the biology behind what drives this disease is vital for early diagnosis and treatment."**

Robert Nkwo
PhD student

of their purpose and effect in a cancer setting. He then hopes to add this information to the new algorithms to help conduct retrospective validation exercises, testing the algorithms to see whether or not they would have recommended the same treatments allocated to patients.

The findings of this seed study, which he aims to publish in a peer-reviewed journal, will hopefully attract wider financial support from major external funders to develop this groundbreaking research even further.

King's Liver Biobank

Biobanks are a vital tool in the study of complex diseases, like cancer. King's Liver Biobank stores blood and other tissue samples that have been generously donated by patients to help scientists research better ways of diagnosing, treating and preventing cancer in the future.

"The samples of liver cancer tissue that we receive are critical to what we do. We try and treat every donation with the respect it deserves because it comes from someone who is sick and essentially making a sacrifice.

"It usually it takes a long time to go from lab work to a tangible benefit for patients. So, the work that is being carried out may not actually help the people who are donating samples. They are coping with their disease right now and giving that extra bit of blood or tissue in the hope that they will help somebody else in the future.

"We try really hard to remember that these are extraordinary gifts from patients. They are human beings, not faceless samples that come into the biobank and sit in the fridge. They are special and need to be treated as such."

Tom Dowe
Liver Biobank Manager

"I am frustrated that I cannot be cured but know that every penny I can raise will help the medics better understand liver cancer progressions and allow them to treat people like me in the future."

Mark Thornberry, 1960-2020

Investigating mitochondria function

Roger Fontana is using a grant from a generous donor to investigate the role of mitochondria function on patients with HCC. Mitochondria are small structures within cells that produce about 90 percent of the chemical energy that cells need to survive. Cancer cells have high energy requirements: they reproduce continuously and uncontrollably, invading healthy tissue and hoarding nutrients. It is therefore crucial to understand how the mitochondria function works and the impact it can have on patients diagnosed with HCC, such as fatigue, loss of appetite, weight loss and metastasis.

A major part of Roger's three-year study, which began in October 2020, investigates how exosomes, which are extracellular vesicles (EVs), reprogram the mitochondria to alter a cell's metabolism. EVs are produced by most cell types in our body and contain numerous biological molecules that have a significant effect in many physiological processes. This is also true for cancer, as it is becoming increasingly clear that tumour cells use EVs to promote their survival and progression. Thus, it is important to devise an effective way to isolate EVs so that their capabilities can be studied.

With this goal in mind, Roger has been culturing liver cancer cells and investigating the best conditions to isolate these vesicles. This technically challenging task is vital if we are to understand the role that these liquid-filled bubbles play in the energy systems of cells.

By studying the effect of tumour-derived EVs on healthy liver cells, Roger is exploring whether small fragments of micro RNA within the bubbles are able to reset the energetics of the cell system by changing the way in which mitochondria behave. If he can demonstrate that there is a mechanism where EVs secreted by a cancer cell alter the way energy is used by other local and

distant cells, then there is the potential for EVs to be used to help diagnose disease. Furthermore, if he can find a way to manage this system, it may be possible to devise a means of controlling the genetics of liver cancer.

Being able to understand these mechanisms will give clinicians greater insight into the development of these complex tumours. Not only could this research result in more accurate predictions for and in response to existing therapies, it could also lead to the development of new therapies that could be personalised to each patient – making the treatment so much more effective.

“I am excited to take advantage of the infrastructure and expertise at King’s to try and explicate new bioenergetic mechanisms of liver cancer development. It is my hope that in formulating a deeper understanding of the disease, new therapeutic targets will be unravelled.”

Roger Fontana
PhD student

Using machine learning to improve outcomes for patients

A grant from a charitable donor has enabled Megan Illingworth to facilitate the diagnosis and treatment of patients with primary sclerosing cholangitis (PSC) and associated cholangiocarcinoma (CCA), by investigating new ways of predicting cancer risk and suggesting individualised treatments.

PSC is a rare and chronic liver disease that slowly damages the bile ducts lining the liver. It significantly increases the risk of cancer development, particularly CCA: a rare cancer that usually results in a terminal prognosis.

A previous King's study defined the activation protein profile of CCA and created two algorithms that enabled researchers to identify which enzymes are activated in this disease, as well as suggest a group of drugs that might be beneficial. As part of her three-year study, which began in October 2020, Megan will test these algorithms on other biological data sets taken from CCA patients to see whether or not they produce the same drug recommendations.

Another aspect of her research will involve the application of the same machine-learning algorithms to tissue samples from King's patients with PSC, as well as those PSC patients who went on to develop CCA. Her work aims to examine whether it is possible to identify which pathways determine whether or not a person goes on to develop the cancer and what potential treatments are likely to help.

Although machine learning is an accepted approach in the study of blood cancers, it is relatively new in the field of liver cancer and solid organ research. It is hoped that these studies will eventually pave the way for

future tailor-made treatments, where patients are given individualised drugs based on machine-learning analysis of their tissue samples.

In addition to Megan's body of work, financial support from two charitable donors has helped drive forward further research into CCA. Professor Heaton explains, "The paper we submitted on our use of protein phosphorylation attempts to analyse whether we can identify existing treatments that could find new applications in selected CCA patients or find new targets for therapy. Published in *Cancer Research*, a journal of the *American Association of Cancer Research*, the findings will help us identify patient-specific treatment options, tailoring treatment to suit their needs."

"It is a pleasure to work with the incredible and talented researchers at King's, in state-of-the-art facilities. I hope to explore why PSC patients are so at risk of CCA by undertaking RNA sequencing of this disease combination. My findings will form the basis for continued research, with the aim of improving outcomes for these patients with liver disease."

Megan Illingworth
PhD student

Shaping the next decade

The field of liver disease and treatment is constantly evolving and the development of new life-saving medical advances will only be possible through research.

“We provide a formidable clinical service and are rapidly strengthening our research capabilities. It is our aim to be one of the top ten liver research institutions in the world within the next five years,” says Professor Heaton.

The impact of external factors on liver disease

Diet and exercise can have significant bearing on the health of the liver and the prevention and management of liver disease. Passionate about the positive effects of a healthy lifestyle on liver outcomes, Professor Heaton believes that greater emphasis must be placed on the key areas of diet, exercise, muscle strengthening and mental health.

As the general population ages, the majority of liver patients treated at King’s have illnesses caused by their lifestyle. Professor Heaton and his colleagues are working on systems of early intervention to help these patients avoid liver transplantation. Pilot programmes that interrupt the behaviours of those at risk from liver disease can be used to great effect. These programmes can then be rolled out at a national level to influence and embed good behaviours.

“Those we treat for liver disease rely on medical intervention for treatment or a cure but then resume old unhealthy lifestyles that can lead to repeating the cycle of ill health,” says Professor Heaton. “Future programmes need to be less reliant on a pharmaceutical-based approach – instead, we must focus on changing habits.” He and his colleagues aim to set up a liver lifestyle management clinic where a very different group of healthcare professionals would care for patients’ wellbeing. Behavioural therapists and psychologists would work in partnership with doctors and nurses to advise those at risk and help change behaviours, with the goal of encouraging a healthy diet and regular exercise.

> **“The way we eat, drink and behave needs to be adapted to enable medicine to work in a more integrated way with patients.”**
>
> **Professor Nigel Heaton**

For those unable to exercise, an electrical muscle stimulation device may provide the solution. “What I like about this technology is that it stimulates all the major muscle groups using electrical pulses and simulated exercise,” says Professor Heaton. “If you are physically unable to exercise, you can still sit in a chair for twenty minutes and get the equivalent of two hours of vigorous exercise.”

Once funding can be secured to purchase two electrical stimulation devices, he aims to run an academic pilot programme to trial these machines. In conjunction with physiotherapy, dietetics and lifestyle advice, his objective is to give patients on the liver transplant waiting list a weekly treatment over three months to strengthen their muscles. If this trial were successful, it would act as a prelude to taking on elderly patients who are frail and unable to exercise. It also has the potential to benefit post-transplant patients who need to improve their physical strength and speed up their recovery.

The future of transplantation

Over the next decade, Professor Heaton and his colleagues will continue to focus on strategies and techniques to increase organ utilisation, improve their survivability and longevity, as well as evaluate and enhance the condition of organs that are available for transplantation.

Machine perfusion is a key component in addressing some of the existing issues. Future national and international machine perfusion research could establish that it is advantageous to use both HMP and NMP methods.

This theory has enormous potential; because it uses oxygen to replenish energy levels, it could prevent damage to the liver during transportation from the donor hospital and it may reduce the risk of ischemia reperfusion injury in the recipient. Furthermore, because the liver undergoes machine treatment at body temperature at the end point, it would allow the surgeon to assess the liver's function and quality prior to implantation.

"The next step of researching the potential of reperfusion is to understand how to 'reset' livers to improve their function before they are implanted," explains Professor Heaton. "Trials of new agents that encourage regeneration prior to transplantation will be the next step." Developing these novel forms of intervention will enable clinicians to improve the quality of livers prior to transplant, which in turn will help guarantee the safety, success and longevity of every graft they implant.

> **"I can see for the next ten to fifteen years, or possibly beyond that, transplantation for cancer of the liver is going to become increasingly important, so it is vital that we continue to develop research in this area and encourage patients to be sent to us to manage their care."**
>
> **Professor Nigel Heaton**

The study of phosphoproteomics

Proteomics studies the composition of proteins within living organisms and phosphoproteomics is a branch of proteomics that identifies, catalogues and characterises proteins containing a phosphate group. Through the study of phosphoproteomics, Professor Heaton and his colleagues are working to identify novel ways of managing patients more effectively by targeting their therapy and avoiding drugs that have limited purpose and cause debilitating side effects.

Phosphoproteomics provides clinicians with two new layers of information. The first layer offers clues on what protein or pathway might be activated – this is because a change in phosphorylation status almost always reflects a change in protein activity. This shift would enable clinicians to understand at what point this occurs on the cancer-development pathway. The second layer indicates which proteins might be potential drug targets, with one of the aims being to identify the drugs that work well for each specific patient. Developing this understanding of phosphoproteomics is vital because even when clinicians provide personalised treatments based on genomics, they are sometimes only 20-30 percent effective.

The paper recently published in the journal *Cancer Research* explores phosphoproteomics in CCA allied to machine learning to predict and rank drug suitability for patients. The findings show the potential to identify drugs and rank them in order of likely response for CCA, for individual tumours. This method systematically predicts the efficacy of anti-cancer drugs.

In order to determine accuracy, Professor Heaton now aims to test the findings with real patients who are receiving treatment. “The next phase in our development is to examine tissue before patients are treated,

predict whether they are going to respond, and observe the response in a clinical environment," he says. "The more patients we recruit, the more cancers we can analyse and, therefore, the more sophisticated our data will be in predicting responses. The really wonderful thing about this technology is that it does not apply to just one cancer, it can be applied across the board."

Working in partnership to save lives

Professor Heaton believes that investment and results go hand in hand and continued support is essential if he and his team are to realise their patient outcome and research ambitions. By putting their trust in King's College Hospital Charity and our supporters, they can focus on driving innovation.

"The Charity provides expertise in fundraising and has professionalised how we create and maintain long-lasting relationships with the many generous donors who are interested in our research, liver care and King's. It supports us in so many ways," says Professor Heaton, "providing much-needed facilities for patients and enabling us to purchase specialised equipment, such as the perfusion machine and the operating microscope that allows us to see tiny vessels very clearly during surgery.

"It also secures funding for seed research. For younger researchers, having access to seed money is vital if they hope to further their liver studies. Importantly, the Charity also makes it possible for us to develop new and exciting research ideas to the point where we are able to apply for external grants from a position of strength.

"King's College Hospital Charity is hugely important in the life of King's. We have the same goal – to improve the lives of patients and their families."

“

This ongoing support enables us to forge ahead with our work for liver patients nationally and globally. We have made many advances over the past five years and I believe we are about to witness another ten to fifteen years of really accelerated change – I hope so, for the sake of our patients, because survival is not enough.”

Professor Nigel Heaton

Key publications

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