A team of infectious disease clinicians, microbiologists and protein chemists, writing in the *Journal of Infectious Diseases*, has found that *S. pyogenes* has the ability to destroy one of the immune system’s key ‘messengers,’ a molecule that alerts the body to the bacteria’s presence. By disabling the messenger, the body is prevented from attacking the bacterium, allowing it to colonise the body and cause disease.

“We wanted to find out why *S. pyogenes* can be so deadly, and in particular why certain strains are far more virulent than others,” explains consultant Dr Shiranee Sriskandan. “What we discovered was an entirely new and quite different process by which this bacterium evade the immune response.”

The research began when a patient admitted to hospital died from necrotising fasciitis caused by a virulent form of *S. pyogenes*. Examining post-mortem samples, the researchers saw that despite the presence of bacteria in muscle tissue, there were hardly any white blood cells, normally the body’s first line in bacterial defence.

After isolating and growing the strain, the researchers were able to work out using biochemical methods that the bacteria prevented the immune system leaping into action by ‘shooting the messenger.’

“We found that the bacteria interact with messenger molecules called IL-8, and stop them from working,” comments Dr Sriskandan. “This in turn prevents neutrophils, white blood cells that destroy bacteria, from migrating towards the infection. Stopping this process of neutrophil recruitment to the infection site allows the bacteria to colonise the body, causing disease.”

The group turned to the expertise of Dr Robert Edwards in the department of experimental medicine and Dr Graham Taylor in proteomics to look further at this discovery. By breaking down the bacterium and analysing small fragments, the group found that a particular piece of the bacterium’s outer coat, which they have called SpyCEP, was responsible for degrading IL-8 by cutting its protein chain at a specific point. “Isolates of *S. pyogenes* which contained the highest levels of SpyCEP were by... continued overleaf...
far the best at degrading IL-8, so naturally this is an area we are now looking at in more detail," comments Dr Sriskandan. By purifying and analysing the SpyCEP fragment, the group hopes that before long it will have identified potential targets for treatments. “There is currently no vaccine against all types of group A strep,” adds Dr Sriskandan. “We are hopeful that this is the first step to developing one that is broadly effective and safe.”

The group puts its success down to the critical mass of expertise available on the Hammersmith site. “It is the ability to ask, and have the expertise to answer, clinically relevant questions with the backup and support of the right people,” comments Dr Sriskandan. “Translational research is often thought of as being a one-way route whereby treatments developed at the lab bench lead to improved patient care. This is translational research, but the other way round - a clinical observation has led us back to the lab. It’s good to have the expertise here to enable that to happen.”

The lab has recently received funding from the Lee Spark Foundation - the UK/European necrotising fasciitis patient support group - and the Conor Kerin Memorial Fund, to take their research forward. The hospital charity trustees provided the initial funding for the project.

**Streptococcus pyogenes**

Many people carry *S. pyogenes* harmlessly on their skin and in their upper respiratory tract. It is responsible for a large number of sore throats and minor skin infections, but depending on the site and severity of infection, can cause more serious illnesses. These include bloodstream infections, toxic shock syndrome and severe invasive infections of the skin such as necrotising fasciitis - better known as “flesh-eating bug disease” in newspaper scare stories.

Over 2000 cases of invasive disease caused by *S. pyogenes* - also known as group A streptococci - are reported in the UK each year. Up to one in five patients die if bacteria get into the blood, a figure that can rise depending on the severity of infection.

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1. Edwards et al., Specific C-terminal cleavage and inactivation of interleukin-8 by invasive disease isolates of *Streptococcus pyogenes*. Journal of Infectious Disease, 2005 192: 783-90

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**LOWER TAXES FOR A LONGER LIFE?**

“In this world nothing can be said to be certain, except death and taxes,” wrote Benjamin Franklin in the late 1700s. The American polymath would no doubt be pleased to hear that both of life’s definées seem to be linked. A desk-based study carried out by cardiologist Dr Peder Bagger at Hammersmith Hospital and Imperial College London has uncovered what could be an intriguing link between the taxes we pay and our life expectancy. Pay too much and we risk dying early?

Using data on tax burden from the Organisation for Economic Cooperation and Development (OECD) and life expectancy data from the World Health Organization, the study showed that in Europe, a higher tax burden was correlated with a lower life expectancy.

“During the last 50 years personal income has shown a steady increase in western European countries,” comments Dr Bagger. “During that time taxation has increased in most of these countries to finance increased welfare spending, with a corresponding rise in life expectancy. But European countries with the highest incomes, Denmark and Germany, are among those with the lowest life expectancy. These countries have the highest taxation rate - does a threshold exist where high taxes exert a negative influence on life expectancy despite increased welfare spending?”

Dr Bagger is quick to acknowledge there may be many confounding factors, but believes the link merits further study. “The sheer simplicity of the study and its findings may not have many people convinced, judging by the relative obscurity of the journal it was published in, the Central European Journal of Public Health,” he adds.

“But we could be on to something. For example, several studies have tried to explain the ‘Danish paradox’ - the fact that lower life expectancy in Denmark, compared with other European countries, is mainly caused by a higher mortality rate in the 35-74 year age group. But at this age, aren’t you the most likely to be affected by the consequences of heavy taxation? I think the findings suggest that tax burden should be considered among the multiple factors influencing life expectancy.”

**GUT HORMONE INJECTIONS EFFECTIVE IN REDUCING WEIGHT**

A hormone found in the small intestine has provided a crucial breakthrough in developing new drugs to tackle the growing obesity epidemic, claim scientists. Obesity now affects more than half of all UK adults, costing the UK up to £3.7 billion a year in sickness absence and healthcare treatments.

In an article in the journal *Diabetes*, a team from Imperial College London and Hammersmith Hospitals NHS Trust has used injections of oxyntomodulin, a naturally occurring digestive hormone found in the small intestine, to reduce body weight and caloric intake in overweight volunteers.

Professor Steve Bloom, whose group has identified and successfully trialled a number of gut hormones involved in appetite control, says the discovery that oxyntomodulin can be effective in reducing weight could be an important step in tackling the rising levels of obesity in society.

The injections boost existing levels of oxyntomodulin, normally released from the small intestine as food is consumed, signalling to the brain that the body is full and has had enough to eat. “Not only is it naturally occurring, so has virtually no side-effects, it could be ideal for general use as it can be self administered,” comments Professor Bloom.

“But despite this, we still need to conduct larger clinical trials to test its effectiveness over longer periods.”

The researchers found that over four weeks, injections of oxyntomodulin three times a day in 14 volunteers reduced their body weight by an average of 2.3kg. They also found that daily energy intake by the test group was reduced by an average of 170kcal after the first injection.
NEW HAEMOPHILIA TEST OFFERS HOPE OF HEALTHY BABIES

Scientists on the Hammersmith Hospital campus have for the first time used preimplantation genetic diagnosis (PGD) successfully to enable a woman to give birth to a baby unaffected by haemophilia. Professor Ted Tuddenham and his group at the MRC clinical sciences centre and IVF specialists at Queen Charlotte’s Hospital used a new test developed at Hammersmith to ensure that only embryos that carried at least one copy of the functioning gene were implanted.

PGD, developed at Hammersmith by Professor Lord Winston and his colleagues in the early 1990s, has been used since then to identify embryos unaffected by an increasing number of diseases where a single gene is the cause, such as cystic fibrosis and muscular dystrophy.

Haemophilia A, the commonest type of inherited bleeding disorder, is caused by mutations in the gene responsible for factor VIII, a protein that plays a key role in the process by which blood clots. Patients with haemophilia have to inject factor VIII regularly, not only to prevent excessive bleeding from cuts and bruises, but more importantly to ensure that spontaneous internal bleeding, usually into the joints, is controlled. Left untreated these bleeds cause severe pain and joint damage, leading to progressive disability.

Haemophilia, in common with other X chromosome-linked disorders, affects only males. Females have two copies of the X chromosome, so if they have one normal copy of the functioning factor VIII gene and one mutated copy they are carriers but usually unaffected themselves.

“Previous attempts to use embryo selection for haemophilia involved discarding all male embryos,” comments Professor Tuddenham. “Unfortunately this meant that the 50% of male embryos that were not affected were also discarded. This new test is completely specific, and offers real hope for haemophilia sufferers wanting to conceive a normal baby, particularly for those who would like to have sons.”

The group’s task was to analyse embryos to identify those that were not affected, by taking a single cell from an embryo of only 6-8 cells produced through an IVF cycle carried out by obstetrician Stuart Lavery and embryologist Ben Lavender. The cell’s DNA was then extracted and multiplied up, and selective DNA cutting enzymes added to detect the mutation. Because many different types of mutation to the factor VIII gene can cause haemophilia, the task was made harder as the researchers had to make sure they were correctly identifying the mutation. “With only one cell, you only have one chance,” comments Dr Kate Michaelides, whose painstaking job it was to develop markers for the test to ensure the analysis could be done on a single cell. “There’s no room for error when the end product is a baby.”

“This is the first time PGD has been directly used to detect the mutation in haemophilia,” adds Professor Tuddenham. “We now have the methods at our disposal to eradicate haemophilia in a blood line. We are enormously pleased with the successful birth.”

Recipients of the first ever PGD haemophilia test, Debbie and Steve Hunter, underwent one cycle of IVF treatment. The resulting embryos were tested for the presence of the mutation. Two embryos were suitable for implantation, one normal (either boy or girl) and one female that carried the disease, but would not be affected. One embryo resulted in the birth of a healthy baby girl, Grace, earlier this year.

and by 250kcal at the end of four weeks. The average recommended intake is 2500 kcal per day for men, and by 250kcal at the end of four weeks. The average recommended intake is 2500 kcal per day for men, and 1940 kcal for women.

Interruption claudication is more common in men than in women, and affects around one in twenty patients over 70.

INFLATABLE STOCKING THERAPY INCREASES MOBILITY

An inflatable stocking could provide relief for thousands of elderly people suffering mobility problems due to diseased arteries.

In a small trial, patients with intermittent claudication - a painful condition where blocked arteries limit blood flow to the legs and cause cramps and difficulty in walking - found they could walk up to two and a half times as far without symptoms after using an inflatable compression stocking for three hours a day for six months. Relief from symptoms continued for up to a year after the treatment had finished.

Dr George Geroulakos, consultant vascular surgeon at Hammersmith and Ealing Hospitals and Imperial College London, and his team have shown that using the stocking is just as effective as intensive physiotherapy in increasing mobility. Connected to a small pump, the stocking is wrapped around the affected leg and inflated three times every minute, squeezing blood out of the veins in the leg.

Claudication (from the Latin word “to limp”) is the pain that occurs in patients with peripheral artery disease when they exercise, particularly during walking. When the patient exercises, insufficient blood flow reaches the lower legs, causing tingling pain and immobility. Patients have to stop walking until the pain goes away.

Intermittent claudication is more common in men than in women, and affects around one in twenty patients over 70.
Two-pronged attack on ovarian cancer

Prevention and treatment of ovarian cancer are the over-arching aims of a new clinical and research unit, organised jointly at Hammersmith Hospital and the Royal Marsden, and funded by the charity Ovarian Cancer Action (HHMT).

Plans for the venture already include a wealth of studies spanning the entire research spectrum from basic science to clinical trials, with some projects pulling in collaborators from as far afield as Australia and western USA.

The unit’s director, Hammersmith’s Professor Hani Gabra, says securing this funding is a remarkable achievement for the two hospitals. “Together these new facilities will provide a formal framework for the kind of research for which Hammersmith is renowned. They will strengthen the rest of cancer research at the trust and Imperial College and provide an environment where women with this disease can get the best possible deal,” says Professor Gabra, who is also the strategic theme leader for cancer at Imperial College London.

He also welcomes the opportunity to work with colleagues at the Royal Marsden. “The message is clear that collaborative research across institutions is the way to achieve rapid growth in our knowledge of ovarian cancer.”

Ovarian cancer action (HHMT) has a world leading scientific reputation, and for the last twenty years has been the foremost organisation in driving research forward. Following a peer reviewed selection process, the charity has awarded the two-centre collaboration £250,000 a year, for three years initially.

A portion of the grant will fund postdoctoral researchers in key areas such as stem cells, tumour suppression genes and metabonomics - the study of metabolic ‘signatures’ in biological fluids which can be used to identify specific disease states and parameters such as responsiveness to therapy.

Professor Gabra explains: “Metabonomics has very high sensitivity and specificity - almost 100%. If we can identify signatures for ovarian cancer we might be able to develop a screening tool to prevent or detect it early. We may be able to use this to predict which women are likely to benefit from certain treatments.” Researchers in California, Texas and Australia will be working with the London team on identification of the biological signatures.

Doctors and scientists in the stem cell programme will be trying to identify the small population of cells in malignant tissue that continue to proliferate even in the face of chemotherapy. “We are beginning to recognise surface markers for these cells,” says Professor Gabra. “And our next objective will be to understand how to direct treatment against them.”

Genetic changes in ovarian cancer will also come under the spotlight. Hammersmith researchers identified the OPCML gene about two years ago and demonstrated its role in cell adhesion. OPCML seems to be switched off in about 90% of ovarian cancers, allowing cells to replicate more quickly, resulting in the formation of tumours. Another gene, WWOX, is believed to play a part in programmed cell death (apoptosis), an important mechanism for preventing over-proliferation and thus malignancy.

Researchers at the new unit will be exploring how the gene becomes inactivated, and what happens when WWOX function is restored in ovarian tumours.

About £15,000 of the annual funding will go towards clinical trials of immunotherapy for ovarian cancer. This novel approach involves immunising the body against an antigen on the surface of malignant ovarian cells, and thus provoking the body to reject and kill the cancer.

Professor Gabra says: “This is an example of how good, basic science can be translated to clinical trial level. And we expect to work on many more examples.”

He explains that the collaborative unit allows researchers to work with a large population - about four million - so that clinical trials can be completed more quickly.

“And that means far less delay in bringing the benefits to patients. At the moment, consultants have to do this work in a relatively piecemeal way, in single centres. The new unit will allow us to run co-ordinated complex trials across a large patient group. And it will allow more uniform access to new treatments.”

The unit’s research efforts will not be restricted to the physical aspects of ovarian cancer. There are also plans for studies of the psychosocial impact, again with international collaboration.

“The unit represents a fantastic opportunity to develop a one-stop shop for ovarian cancer research,” says Professor Gabra. “I believe it will have a real impact on the control of ovarian cancer and improve the prospects of the women who, unfortunately, develop this disease.”
TEAM TACKLES RARE DISEASE

Pulmonary arterial hypertension (PAH), a rare but devastating disease, is being explored by collaborators at Hammersmith. Their aim is to develop biological markers, objective treatment endpoints and new therapies.

One of the main challenges they face is the low prevalence of the condition, which makes effective randomised trials difficult to organise. However, Martin Wilkins, professor of clinical pharmacology at Imperial College London, and co-researchers reported a landmark study this summer – the first ever head-to-head comparison of PAH treatments.

They compared two oral treatments: bosentan, which was approved for PAH in 2001, and sildenafil (Viagra) in a study supported by the British Heart Foundation, and with no pharmaceutical industry funding. Their paper also introduced a new method for assessing treatment efficacy – measurement of right ventricular mass using MRI.

The results of the 26-patient study suggested sildenafil was at least equivalent to the more established treatment, thus adding a potential new weapon to the fight against PAH. There was no significant difference after four months of treatment, but there were some intriguing trends. Right ventricular mass was reduced by an average of 8.8g in the sildenafil group, compared with 3.0g with bosentan. Patients taking sildenafil were also able to walk further in six minutes – currently the gold standard assessment for treatment progress in PAH.

Dr Simon Gibbs, clinical senior lecturer at the Hammersmith-based National Heart and Lung Institute, developed the MRI assessment method. He says randomised controlled trials across at least two continents will be needed to establish the best ways of tackling PAH.

An editorial accompanying the sildenafil vs. bosentan study stresses that neither is a panacea. It states: “Although both drugs ameliorate symptoms and improve exercise capacity, neither normalises haemodynamics nor shifts all patients to functional class I status.” However, it welcomes the addition of sildenafil to the potential ‘therapeutic armamentarium’ against PAH.

Although PAH can strike at any age, typical patients are young mothers who find they can no longer keep up with their active, young children. Ten years ago, clinicians had nothing to offer. Then in 1995 intravenous epoprostenol became the first licensed treatment for the condition, followed six years later by bosentan.

Dr Gibbs says: “PAH is now treatable, although the prognosis remains very poor and all current treatments fail eventually. Our goal now is to achieve good long-term results.”

The collaborators propose a new pilot study involving 50 patients, using statins to treat the disease. There is evidence that these drugs, already widely used in the management of high cholesterol levels and coronary heart disease, may reduce or reverse vascular remodelling in PAH.

Professor Wilkins and Dr Robert Edwards, research lecturer in Imperial College London’s department of experimental medicine and toxicology, are also working on proteomics in PAH, looking for a protein signature for the disease as an aid to diagnosis and treatment monitoring.

Dr Gibbs says: “An objective marker would be extremely beneficial as there are currently long delays in diagnosis – up to two years in the UK. The symptoms, such as breathlessness, are entirely non-specific. And as a result we believe many people with PAH are never referred.”

PAH Factfile

- There are believed to be about seven people with PAH per 100,000 population in the UK
- About 120 new cases are diagnosed each year
- The disease can be indolent or can kill the patient rapidly
- Historical data suggest the median survival after diagnosis is 2.8 years
- Most cases are idiopathic, meaning there is no known cause
- The disease can occur at any age, but it most commonly affects women in their thirties
- Hammersmith is one of four designated centres of excellence in England for the care of patients with PAH

SAFER HEART-LUNG MACHINES USING ANCIENT TECHNOLOGY

The technology is not new - the ancient Egyptians were using it for water filtration over 3000 years ago - but a new application for activated carbon could improve the heart-lung machine, the heart surgeon’s most useful tool. A team of researchers at the National Heart and Lung Institute at Hammersmith Hospital have shown that tiny particles of carbon can remove contaminants from blood that commonly cause side-effects including serious disability.

First used in the UK at Hammersmith Hospital in 1953, the heart-lung machine oxygenates and circulates blood externally during open-heart surgery. Last year over 30,000 patients in the UK were placed on a heart-lung machine during surgery. Hospital admissions for heart failure are projected to increase by over 50% over the next 25 years.

Clinical scientist Professor Terry Gourlay and his colleagues, who include doctors, engineers and chemists, have been studying how fat droplets, or microemboli, develop in the blood while a patient is connected to a heart-lung machine. Microemboli can become lodged in the small blood vessels in the brain, preventing blood flow and causing small strokes known as transient ischaemias. In severe cases brain damage and death can result. The main source of microemboli is thought to be through the surgeon’s use of suction to remove blood from the chest cavity, which is returned to the bloodstream via the heart-lung machine.

“Microemboli blockages are responsible for a significant proportion of people suffering memory loss, minor personality changes and other brain dysfunctions,” says Professor Gourlay. “Over half of all patients who have been on heart-lung machines show some of these signs, so this is not an insignificant problem.” An American study has shown that for each hour spent on the heart-lung machine the number of microemboli in the blood doubles. “This of course doubles the risk of more serious or permanent damage,” adds Professor Gourlay. “There’s no doubt that the heart-lung machine has saved thousands of lives, but even in this modern era complications caused by microemboli are still common.”

The task of removing microemboli from the blood is a difficult one. Most are the size of blood cells, meaning filtering out the fat is impossible. The group believes that activated carbon is the answer. Working with colleagues at the University of Brighton, the group has exploited the extraordinary adsorbent qualities of activated carbon. They have developed a short section of tubing that can be fitted into the heart-lung machine. Blood passes through the tube, but fat is adsorbed on to the carbon, removing all traces from the blood which is returned to the body.

Using blood taken from patients undergoing coronary artery bypass grafting at Hammersmith, the team have demonstrated that tubes made from beads of carbon approximately 40 microns in diameter (about half the width of a human hair), remove 100% of microemboli with a single passage of blood. Removing all emboli first time is crucial, as any that return to the circulatory system have the potential to do damage. “The right size of bead is crucial to how effective the tube is,” says Professor Gourlay. “With over five litres of blood passing through the machine every minute, finding a recipe for a tube that removes all traces of fat but does not damage the blood constituents was a major boost to our work.”

The team have just received government funding to bring their carbon tubes closer to the market, and are working with Mast Carbons in the UK and the Japanese firm Terumo. Professor Gourlay believes that the potential new application for this ancient technology is vast. “There are other branches of surgery where removing fat emboli is important - from liposuction to hip-replacement surgery,” he says. “As we increase our understanding of how the structure of carbon relates to its adsorbent properties, we also increase the potential for its more widespread use.”

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A heart lung machine in action.

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Scanning electron micrograph of a fat droplet, or embolus.

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Fat droplets (orange) in plasma taken from a patient on a heart lung machine. The largest droplets here are approximately 20-30 microns in diameter.
As a result, according to Dr Steve Brett, the would-be ICU researcher must become ‘an opportunist’. As consultant and lead clinician in ICU at Hammersmith Hospital, Dr Brett is ready to seize chances for collaborative work with specialists from other disciplines in the trust and beyond. Recent endeavours have involved research partnerships with surgeons, dietitians, psychologists, pharmacists, statisticians and specialists in resuscitation.

“Critical care is a multidisciplinary service, with a multidisciplinary clinical team, which is clearly echoed in our research practice,” says Dr Brett.

He points out that his collaborative efforts are also heavily reliant on the strong research ethos of Hammersmith. “The trust has a long history of research – it is part of the culture of the organisation – and it is very supportive of NHS consultants who want to conduct projects. I also rely on the goodwill of the trust’s clinical research committee for funding, as the major grant bodies are currently not very supportive of clinical research in critical care.”

Dr Brett pays tribute to the nursing staff in the intensive care unit. “The collaborative studies would be impossible without their support and dedication,” he says.

The long-term impact of critical illness has been a major focus of Dr Brett’s work. Studies in collaboration with surgeon Professor Robin Williamson and research psychologist Dr Kannika Sukantarat have shown that patients face many months of physical and mental illbeing after discharge from intensive care.

Depression, anxiety and difficulties in cognitive function affect how people cope with their day-to-day activities, but they do gradually improve over the course of a year after discharge. There can also be substantial physical impairments that persist for a year or longer.

Dr Brett says: “Many people are disappointed when they still feel unwell months after going home. This can be exacerbated when patients do not remember their original illness because they received sedative drugs during their stay, or because the disease itself has impaired their memory of how they felt at the time. So it is important for them to understand just how long it can take to recover from serious illness.”

Hammersmith’s long-established database of resuscitation outcomes has been an essential resource for two recent projects on cardiac arrest. One has shown that having an infection at the time of cardiac arrest halves the chances of survival. The second demonstrates that people who survive cardiac arrest remain at substantial risk of death in the first few months after discharge. However, this risk subsides towards that of a normal age/sex-matched population after two years.

Dr Brett’s collaborators in these studies include Ken Spearpoint, nurse consultant in resuscitation, and Mike Richards, a statistician in Hammersmith’s department of infection control.

He is also working with dietitian Dr Gary Frost and research fellow Dr Mohsen Nemati, of Imperial College’s department of investigative science, on the effect of appetite and food intake on survival in critical illness. “We are looking at the relationship with gut hormones,” he says.

The high mortality and morbidity associated with ICU provides powerful motivation for Dr Brett’s ‘opportunism’. Around 20-25% of patients die during critical illness, and a substantial number die following discharge.

“And the long-term impact is huge for patients, families and carers,” he says.

Dr Steve Brett in the hospital’s new 12-bed Intensive Care Unit which opened in October.

 ICU research at Hammersmith
2001: Publication of a study demonstrating that major changes to the organisation of intensive care at the trust had improved mortality rates
2002: Collaborative projects with other ICU departments in London including studies of blood transfusion
2003: Work on the relationship between white blood cell counts and ICU outcome
2004: Hammersmith formed part of a multinational study looking at a new method of measuring endotoxin in critical illness
2005: Studies of the long-term impact of critical illness; cardiac arrest projects; impact of gut hormones on food intake and outcome.
The Habib 4X resection device is named after its inventor Professor Nagy Habib, chief of service for gastrointestinal surgery at the trust and professor of hepato-biliary surgery at Imperial College London. It uses radiofrequency energy to seal tissue around a tumour site, allowing the tumour to be removed while preventing blood loss and other complications. The device has enabled surgeons to operate where previously it would have been too risky.

After developing the technology Professor Habib formed an Imperial College spinout company, EMcision, which has a worldwide licence agreement with US-based RITA Medical Systems. The Habib 4X received approval from the US Food and Drug administration in August, and the first operation using the Habib 4X took place at the City of Hope National Medical Center in Duarte, near Los Angeles, California, in September. The Habib 4X is already licensed for use in Europe.

The Habib 4X works by delivering high-energy radio waves through a hand-held device consisting of four electrodes, into tissue around the tumour. They heat cells causing them to dehydrate and thus form a seal. The tumour is removed with a scalpel, with virtually no blood loss, and without the use of staples, glue, ties and sutures.

Before use of the device in the UK for the removal of liver tumours, patients often lost up to 6 litres of blood during the operation. Now, less than 50ml (an egg-cup full) is lost, and the patient spends less time in hospital intensive care. Over 100 patients have been operated on with the new device since October 2004, and none has died or suffered serious illness after the operation. The average hospital stay has been reduced from two weeks to eight days. When patients were followed up over a period of between two and 20 months, tumours had not returned in any of them. “The liver is the second commonest site of cancer in the body,” comments Professor Habib, “So the potential of the Habib 4X is huge. The first use of the device in America is a significant and exciting milestone.”

EMcision has a pipeline of four additional patented products and is currently looking for strategic partnerships with device companies to aid in the regulatory approval process and commercialisation of these products. These include the Habib Microwave Ablator, a microwave device that can be implanted in patients to treat tumours that cannot be removed surgically, and the Habib Implant, a device that can be placed almost anywhere in the body for extended periods to collect medical data.

“We are confident that these devices offer a way of tapping the great potential that radio frequency and microwave technologies have for surgery, with the ability to make quick and lasting improvements in patient care,” adds Professor Habib.

As part of the licensing deal, the Habib 4X will be made available to developing countries in Africa at cost price.

Hammersmith Hospitals NHS Trust, based in north west London, comprises Hammersmith, Charing Cross, Queen Charlotte’s & Chelsea and Ravenscourt Park Hospitals. The unique world-class research environment here provides the opportunity for translational research reaching from laboratory bench to patient’s bedside. In addition to receiving a large proportion of the NHS R&D budget, the Trust works closely with Imperial College London in all clinical specialities. The Medical Research Council’s largest clinical research centre is also based at Hammersmith Hospital and many major charities fund research units. Over 60% of our research budget is dedicated to programmes targeted at national priorities, including cardiovascular disease, diabetes and cancer.