

# 15



UNIVERSITY OF LEEDS

ANNUAL  
REVIEW

**Medical  
Technologies**  
INNOVATION AND KNOWLEDGE CENTRE



## Contents

Academic Director  
John Fisher **03**

Director of Innovation  
Jo Dixon-Hardy **04**

New fund creates  
pipeline for the  
treatment of arthritis **08**

Creating  
commercial impact **10**

Our growing  
IP portfolio **12**

Supporting the  
skills pipeline **14**

Moving  
on up **18**

External advisory  
board **19**

## Regenerative devices: a £1bn per year industry opportunity in the UK

Estimated global market size per year by 2020:

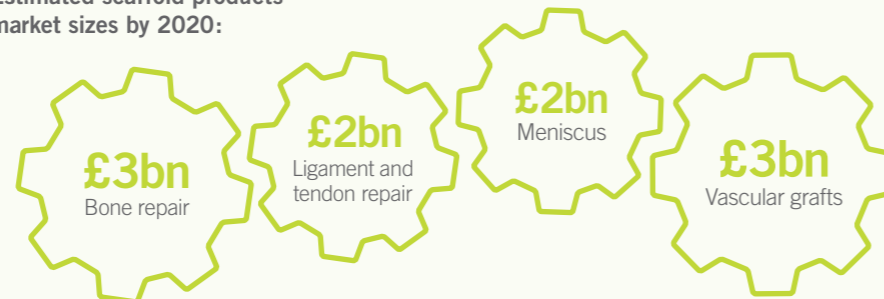
**\$25bn + \$50bn = \$75bn**

Technologies to regenerate tissues with autologous cells

Biomaterials and implants, enhanced to deliver regenerative potential

Global market size

Estimated scaffold products market sizes by 2020:



Scale of opportunity for the UK:



Delivered by reducing uncertainty in early translation:



40 proof of concept projects from 2015



Embedding innovation processes nationally



Building networks with new partnerships

# Towards our ten-year vision

*With our funding for the Medical Technologies IKC secured for a further five years, we can now look forward to the achievement of our long-term vision: the creation of a sustainable £1bn industry in regenerative devices in the UK.*



Professor John Fisher CBE,  
Academic Director,  
Medical Technologies IKC

“

The Medical Technologies IKC has a clearly defined role, targeting a particular gap in the innovation pipeline: the transition from early stage research, through proof of concept to that first commercial investment.

”

## Contents

Academic Director  
John Fisher 0

Director of Innovation  
Jo Dixon-Hardy 0

New fund creates  
pipeline for the  
treatment of arthritis 0

Creating  
commercial impact 0

Our growing  
IP portfolio 1

Supporting the  
skills pipeline 1

Moving  
on up 1

External advisory  
board 1

Over our first five years, we established an effective innovation platform and pipeline to take regenerative devices through from early stage research to commercial investment for new product development and commercialisation. During that time, we contributed to the development of 50 new products or services and helped to create, or support the growth of, five spin-out companies, leveraging an additional £20m private sector investment in industry each year to support new product developments.

We now want to build on these successes, increasing the number of academic and industry partners we work with and doubling the investment we are able to generate from the private sector. A combined annual research & development spend of £50m by 2020 will mean we have established a technology platform to support a £1bn regenerative devices sector in the UK in the future.

The Medical Technologies IKC has a clearly defined role, targeting a particular gap in the innovation pipeline: the transition from early stage research, through proof of concept to that first commercial investment. We have maintained a tight focus on regenerative devices, as an area that can be translated quickly and cost-effectively. This involves both disruptive new technologies and products as well as new technologies to enhance the development of existing products and services.

The next five years will see us continue to target the same stage of the product pipeline, while diversifying into a wider range of clinical applications for the regenerative devices and enabling technologies we support. A large group

of companies and universities have already committed to working with us to address these new challenges. These will include the Cell Therapy Catapult, with whom we'll be developing combination therapies that make use of our regenerative devices as a delivery mechanism.

We also plan to develop more industry-inspired projects to complement our academic-led research, ensuring more effective, strategic input from our industry partners to help us structure and define our research and translation goals.

In the next five years we will build a national centre that involves academics, clinicians and companies across the UK leveraging additional innovation support from a range of sponsors. One example is the additional new funding from HEFCE, which is bringing us closer to home once again, with a project to build capability in early stage innovation amongst universities based in the Leeds City Region. This will involve working across a broader medical technology base, but localised to a smaller number of universities and regional companies.

Capacity building and skills development – both locally and nationally – are a central part of our long-term vision. They will help to ensure we can not only create a robust regenerative devices sector in the UK, but make it sustainable for the long-term.



**Professor John Fisher**  
Academic Director,  
Medical Technologies IKC



**Professor John Fisher CBE,**  
Academic Director,  
Medical Technologies IKC

“  
The Medical Technologies IKC has a clearly defined role, targeting a particular gap in the innovation pipeline: the transition from early stage research, through proof of concept to that first commercial investment.  
”

# Planning for growth and diversity

*The future of the Innovation and Knowledge Centre*

“The Medical Technologies Innovation Programme is a very exciting project that plays to the strengths of all players, particularly the strong track record of translation science within the University of Leeds and the Medical Technologies IKC.”

Emily Wolton, Executive Director,  
Yorkshire Universities



**T**he future of the IKC has been secured for a further five years. A £3m grant from the Engineering and Physical Sciences Research Council will enable us to expand our partnerships in academia and industry across the UK and broaden the medical areas in which we work.

To date, the Medical Technologies IKC has specialised in musculoskeletal and cardiovascular applications, but the next phase will see us venturing into new clinical areas including wound repair, maxillofacial reconstruction, dental reconstruction and general surgery. We plan to support 40 new proof of concept projects to include these areas over the next five years, taking these projects to the stage where they can attract private sector investment.

To meet this target, we will bring in additional funding from charities, industry and other research and innovation organisations, partnering with these organisations to support the translation of knowledge from ten other universities across the UK. We will also work closely with partners with the relevant expertise for our targeted calls, supporting them to do the necessary preparatory work for proof of concept funding.

In 2015, the IKC has already secured new sources of innovation funding to support our forward plan: our partnership with Arthritis Research UK (see p8) has contributed £300k to support three national proof of concept projects. In addition, a £2.25m Higher Education Funding Council for England (HEFCE) Catalyst-funded project will enable us to share the extensive expertise built up within the Medical Technologies IKC over the last five years with other universities in the Leeds City Region (LCR).

A new team of innovation specialists will work with LCR partners to build capacity for innovation, applying IKC expertise beyond our core area of regenerative devices to other areas of medical technologies. Working with the LCR Local Enterprise Partnership, our long-term aim is to establish the LCR as the preferred location for medical technology innovation and inward investment in the UK. The foundations for this exist already: the region already has 100 medical technology companies working in areas that match well with the research expertise within the Leeds City Region universities, covering areas such as skin care, drug delivery, diagnostics, radiotherapy, infection control, assistive technologies and advanced materials.

The project will also draw on our extensive experience of innovation development programmes at different stages of the career pathway, from PhD students through to academic researchers. By helping to retain skilled people within the sector and the region, our training initiatives and career

development programmes are also helping to address the skills shortage within the ‘high value’ medical technologies industry.

The achievements over the past 5 years have been made under the effective and inspiring operational direction of Dr Ceri Williams, and provide a wonderful foundation for the next phase of the IKC. Ceri has recently progressed to a new role as Director of Research and Innovation Development at the University of Leeds, where she will apply the extensive skills and knowledge for which she is so well recognised across the breadth of disciplines.

Our work over the last five years has made a tangible difference, supporting economic growth in the medical technologies sector. We can now build on that, bringing other universities and med tech companies on board and, in particular, sharing our expertise with our partner universities in Yorkshire and across the UK.

As we move towards 2020, we aim to expand our activity as a national centre for medical technology innovation. Working from a local to a global level, while diversifying the technologies and clinical applications we address, will help us deliver an economic boost both to the region and the UK.

*Dr Jo Dixon-Hardy*

Dr Jo Dixon-Hardy  
Director of Innovation,  
Medical Technologies IKC

## What's ahead



“The Leeds City Region is fortunate to have the innovation and translation expertise of the Medical Technologies IKC on its doorstep. Combining those skills and knowledge with the research strengths of the regional universities will offer real advantages to local med tech businesses and the sector as a whole.”

**Roger Marsh,**  
Non-executive Chair, Leeds City Region Local Enterprise Partnership

### Medical Technologies Innovation for the Leeds City Region

**Funder:** Higher Education Funding Council for England:  
**Value:** £2.25 million (2015-2018)

**Project aims:**

- Innovation Managers working across all the partners to identify, prioritise and support the development of technologies that offer the most potential
- Clinical Innovation Programme, to target early adopter clinicians and help to identify and define technologies to address unmet clinical needs
- A dedicated gateway, to connect companies, funders and others to the capabilities in the Leeds City Region HEIs and clinical partners
- Leverage of additional funding to support the development of technologies towards commercialisation
- Regular events (partnership workshops, technology spotlights, sub-sector specialist meetings and clinical need workshops) to bring companies and academics together with other key intermediaries
- Creation of a bespoke innovation toolkit and training in its use, to support medical technology innovation capability within each partner university
- Innovation development programmes, including the Postgraduate Certificate in Innovation Management, delivered to doctoral students, post-doctoral researchers and academics across the partner universities

**Institutions taking part:** Universities of Leeds, Bradford, Huddersfield, York and Leeds Beckett University

### Medical Technologies Innovation and Knowledge Centre: Phase 2

**Funder:** Engineering and Physical Sciences Research Council  
**Value:** £3 million (2015-2020)

**Project aims:**

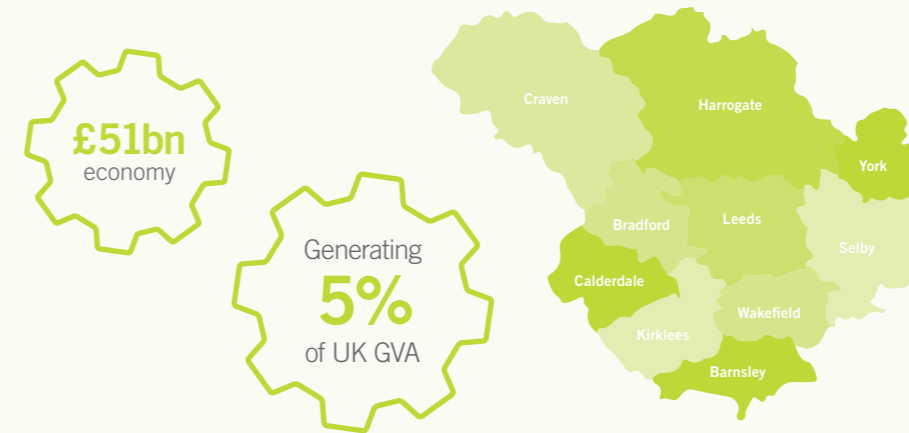
- Expand areas of clinical application to include wound repair, cardiovascular repair, musculoskeletal tissue repair, maxillofacial reconstruction, dental reconstruction, surgery and the demands of the ageing population
- Expand research supply chain to include a wider range of university partners
- Bring in £2.7 million additional research and innovation funding to support projects
- Evaluate 150 new technologies, to identify suitability for POC funding
- Support 40 new POC projects
- Carry out 150 collaborative projects with industry
- Attract £100 million private sector investment to support commercialisation
- Develop technologies through to patents (10), spin-out companies (7), license deals (10) and trademarks (2)
- Provide research & innovation training to 150 undergraduates, PhD students and post-doctoral researchers



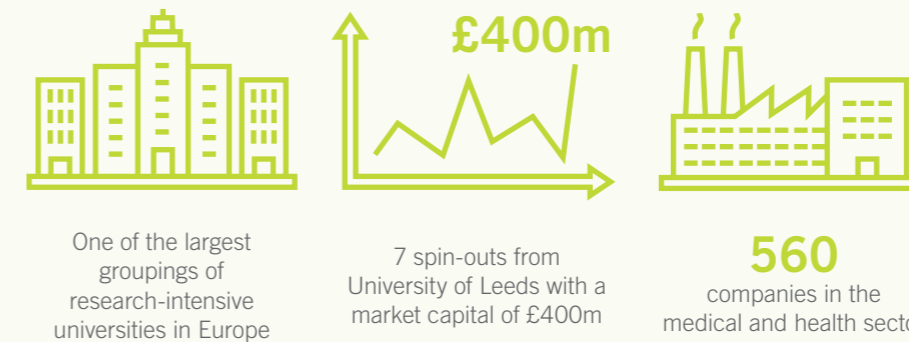
To find out more about what's ahead for Medical Technologies please visit: [medical-technologies.co.uk](http://medical-technologies.co.uk)

## Leeds City Region: The hub of medical technology innovation

### Largest business/financial centre outside London



### Leeds City Region med tech opportunity



### The HEFCE Catalyst funded project will:



Embed innovation in the mindset of researchers through training and development



Support the development of early stage medical technology innovation opportunities



Provide innovation management systems and development of technologies to apply for innovation funding

with **5** regional universities: Leeds, Leeds Beckett, York, Bradford, Huddersfield

to generate **£75m** new investment to the region

delivering a **£1bn** economic return to city region economy

# New fund creates pipeline for the treatment of arthritis

A collaboration piloted this year between the Medical Technologies IKC and Arthritis Research UK is helping extend support for applied and translational research to improve the lives of people with arthritis.

Traditionally, Arthritis Research UK has tended to fund a mixture of fundamental research into the causes of arthritis and early stage clinical trials of new treatments, but not the stages in between. Working with the Medical Technologies IKC, Arthritis Research UK issued a new UK-wide funding call in late 2014 for proof of concept funding for medical technologies that address musculo-skeletal conditions. The aim was to support prototype devices or technologies to a stage where they will be ready for commercial investment or licensing.

“We had over 40 expressions of interest in response to the call, which shows the need for more funding at this stage of the pipeline,” says IKC

Technology Innovation Manager, Graeme Howling. “All of them were very good ideas and innovations, but we had to focus on those that had a real chance of being ready for commercialisation within the timescale, addressing a very clear clinical need.”

Three projects received grants of just under £100,000 for a maximum of two years and these will be managed jointly between Arthritis Research UK and the IKC.

“The Medical Technologies IKC was an excellent fit with Arthritis Research UK for taking this initiative forward, due to their excellent links with industry and sector knowledge,” says Sarah Odoi, Arthritis Research UK Research Translation Manager. “We’ve also had a really good response from our patient stakeholders who inputted into the review process of the research projects, as they could really see the potential benefit from projects closer to clinical use.”

“Combining our long history of funding research with the innovation and commercialisation expertise of the Medical Technologies IKC has enabled Arthritis Research UK to move into a new and exciting area, providing new opportunities to bring benefits to patients.”

**Dr Stephen Simpson,**  
Director of Research,  
Arthritis Research UK.



## Shining a light on cartilage

A new imaging technique to identify molecular changes in soft tissue hopes to reduce surgery and pain for millions of people suffering from osteoarthritis in the UK.

Osteoarthritis is one of the most common conditions caused by progressive degeneration of the cartilage, but it can only be spotted using standard techniques such as X-ray or MRI once it is already well advanced. Even during knee or hip operations, surgeons currently assess the condition of the cartilage visually or by applying pressure, which provides inconsistent results.

A method developed by researchers at the Royal Veterinary College (RVC) and University College London (UCL) uses lasers to identify molecular changes in the tissue that occur at an early stage of the disease. The technique – known as Raman spectroscopy – could be used during operations to enable clinicians to make informed decisions about the most appropriate surgical approach to take, resulting in better, long-term outcomes for patients.

The team, led by Dr Jayesh Dudhia from RVC, plans to use the proof of concept funding to develop a prototype probe that could be used during keyhole surgery on the knee or hip and increase the number of valid molecular markers to improve the reliability of the diagnosis. They also aim to work with potential commercial partners towards licensing the technology.



## Engineering new cartilage

Implants that can help osteoarthritic patients to repair damaged or diseased articular cartilage have had limited success and are only available for the repair of small areas of damaged cartilage. Researchers from University College London, working at the Royal National Orthopaedic Hospital, in collaboration with Collagen Solutions Plc and Oxford MEStar Ltd, are using a proof of concept grant to develop a novel biomimetic 3D scaffold that can be used to repair larger areas of damaged and diseased cartilage. The scaffold, which is implanted in knee or hip articulating surfaces, provides a structure onto which a patient's own cells can grow to create new cartilage tissue. The team has developed an innovative design that replicates the properties of natural cartilage, which can be shaped to fit the damaged area of the joint.

The funding from Arthritis Research UK and the IKC will enable the team, led by Dr Chaozong Liu, to refine the design ensuring reliable and reproducible fabrication of an implant that can be used in clinical trials. Successful delivery of this programme will lead to the development of a scaffold that can be used clinically in a one-step surgical procedure for the treatment of large osteochondral defects. As a result, the quality of life of individuals with osteochondral defects, which lead to osteoarthritis, will be improved allowing a pain free, more active lifestyle.



## Personalised cartilage repair

Funding from Arthritis Research UK and the IKC will also help a team from the Universities of Cambridge and Nottingham to develop an alternative material for cartilage repair which can be personalised to fit an individual patient.

Their design uses a mixture of glass ceramic and polymer materials which have never previously been tested for their effectiveness as a scaffold for cartilage repair. The materials have mechanical properties which are similar to cartilage, are known to encourage the growth of natural tissue and also break down naturally within the body once the cartilage has regrown.

A key element of the project is the ability to personalise the implant to the patient, using a 3D printing technique known as fused filament fabrication.

Led by Dr Frances Heston from the University of Cambridge, the team plans to use the funding to refine the design and manufacturing process and test the scaffold in animal models. They hope to show that the implant is both safe to use and will result in improved repair of cartilage damage.



To find out more information about our research please visit:  
[medical-technologies.co.uk](http://medical-technologies.co.uk)

## Creating commercial impact



The last twelve months have seen the creation of a new spin-out company based on technology supported by the Medical Technologies IKC as well as significant developments in other companies which we have either helped to create or supported in their development.

### Spin-out gets excellent diagnosis

A new spin-out company, Relitect Ltd, has been established to commercialise an innovation supported through proof of concept stage by the Medical Technologies IKC. The diagnostic technology, developed by Professor Christoph Wälti and Professor Giles Davies from the University of Leeds, enables multiple biomarkers of disease to be detected with high sensitivity within small sample volumes.

Relitect secured £750,000 investment funding (in two equal tranches) from IP Group plc with co-investment from IP Venture Fund II and Scottish Enterprise's investment arm, Scottish Investment Bank, via the Scottish Co-investment Fund. The company will now develop the device into a prototype product, generating robust industry data to prepare for commercialisation. The aim is to create a diagnostic device which can work across all diseases where biomarkers have been identified, for use in both clinical and research settings.

The company has established its laboratory in Biocity, near Glasgow and appointed Alan Thomson, formerly of the global diagnostics company Alere, as Technical Director.

Cassie Doherty of IP Group is acting CEO of Relitect: "This is a platform technology able to work across all disease areas, which creates a very compelling value proposition and the potential for a market leading product."

### Tooth technology passes the test

CURODONT REPAIR, a product based on the self-assembling peptide technology developed with Medical Technologies IKC support and licensed to the Swiss company credentis ag in 2010, has shown clear efficacy in a clinical trial. The clinical study, involving 70 patients, showed that carious lesions (i.e. tooth decay) can be treated more than twice as effectively using CURADONT REPAIR and fluoride than by using fluoride – the gold-standard – alone. CURODONT REPAIR is one of a number of products created by credentis based on the self-assembling peptide technology invented at the University of Leeds, now called Curolox® Technology. The results of the clinical trial were presented at the annual conference of the Organisation for Caries Research (ORCA) in July 2015.

The Swiss retail chain Migros has also recently integrated the Curolox® Technology into its leading toothpaste brand, Candida, to create a toothpaste that can protect teeth against food acids and reduce sensitivity of teeth.

Credentis CEO Dominik Lysek says: "The progress of our products this year is very encouraging. The accumulated knowledge we continue to access from the University of Leeds is instrumental in helping us move forward so rapidly."

### Quantum leap forward

The past twelve months have seen some promising developments for spin-out company Quantum Imaging Ltd, says CEO Steve Parker. The company is developing a portable scanner, able to provide an accurate diagnosis of heart attack in minutes, compared to the current 12 hour tests. The technology was taken to spin-out stage with support from the Medical Technologies IKC.

**Q** What were the major milestones for the scanner in 2014-15?

**A** We've now developed a commercial prototype of the scanner and are on track to get this CE marked early in 2016. The scanner has also undergone two clinical trials to show that it provides reliable results in clinical use. One trial involved 120 subjects, half of whom attended A&E with chest pain and half of whom had no symptoms and we expect the results to be published next year. The second study compared 20

patients with known myocardial infarction (heart attack) with 20 patients with no heart issues.

**Q** And developments within the company?

**A** We are just finalising our second funding round and we hope that will take us through to a full commercial launch in 2017. We have also recruited a strong Medical Advisory Board, including many of the leading physicians working in the area, which we'll be announcing towards the end of the year.

### Company progress for Tissue Regenix

Tissue Regenix was established in 2006 based on decellularised scaffold technology patented by the University of Leeds. The company has been working with Medical Technologies IKC since 2009 on proof of concept and co-development projects.

#### Developments in 2014-15

- Raised £20m new investment to develop and launch new products and to expand the direct salesforce for DermaPure® (decellularised human dermis) in the US.
- DermaPure® launched in June 2014, accessing clinical supply chains and a target market worth \$1.4bn a year. Also approved for Medicare reimbursement in 30 states in early 2015 representing a patient pool of 20.7 million people.
- New regional distribution contract signed for DermaPure®, worth a minimum of \$600k over 12 months.

- dCELL® Meniscus in clinical trials, prior to an EU launch in 2016. Medical Technologies IKC worked with Tissue Regenix to characterise the material used in the scaffold and establish criteria for regulatory approval.
- dCELL® Heart Valve gaining significant interest from tissue banks worldwide. Medical Technologies IKC supported Tissue Regenix with proof of concept studies on this technology.
- The Company received a decision to grant a European patent covering the use of its dCELL® technology in creating tissue implants for bladder repair.

## Our growing IP portfolio



**O**ur intellectual property portfolio now covers over 90 patents and patent applications in 17 patent families, covering direct medical devices, diagnostics or companion devices, scaffolds, and enabling technologies. Some of the 50 projects supported by the Medical Technologies IKC from proof of concept stage have now sufficiently developed to be an attractive proposition for industry to take forward, and we are actively seeking commercial partners interested in licensing these technologies.

### Surgical device moves towards clinic

A reusable device that gives surgeons greater control when performing keyhole surgery won a £400k National Institute of Health Research (NIHR) Invention for Innovation (i4i) grant in 2014 to refine the prototype for manufacture and commercialisation and move towards clinical trials.

Inserted in a collapsed state through keyhole incisions, the Intra-Abdominal Platform (IAP) expands like an umbrella, providing a stable internal scaffold with integral grips which retract tissue to expose a specific area or organ, and reduce the need for multiple surgical assistants.

The IAP was the idea of University of Leeds' colorectal surgeon Professor David Jayne and mechanical engineers Professor Anne Neville and Dr Pete Culmer, who worked with the IKC to help develop the technology.

### Stem cell technique to repair tendon injury

Demineralised bone (DMB) has been shown to enhance the regeneration of the tendon bone interface and University College London's Professor Gordon Blunn has been investigating whether seeding with a patient's own stem cells could improve and speed up the repair of rotator cuff injuries in the shoulder.

A proof of concept grant from the Medical Technologies IKC allowed Professor Blunn and his team to refine the techniques used to produce the DMB-stem cell product and start preclinical testing. Initial results suggest that a DMB-stem cell combination is able to regenerate the tendon and connective tissue between the tendon and bone in animals, with those treated with allograft-DMB versions regaining more normal movement compared to xenografts.

"Scaling up from lab to preclinical testing is very expensive, and IKC funding has allowed us to progress faster than we thought possible over this past year," said Professor Blunn. "IKC's project team advised on study set-up and monitoring and on next-stage funding possibilities, introducing us to commercial organisations to discuss taking the innovation forward."

### Protein-based dressing aids wound healing

Market-leading wound dressings commonly made from polysaccharides (originating from plants) are able to soak up the fluid that exudes from wounds which otherwise can prevent them from healing.

However, a textile made from the most common protein in mammals – collagen – could create a dressing able to help wounds heal faster.

Professor Stephen Russell from the University of Leeds and his colleagues have designed technology able to create collagen fibres and, using a standard manufacturing technique, combine them into a fabric that can be used as a wound dressing. Also available as a hydrogel, the collagen material can absorb as much fluid as a polysaccharide-based dressing, while still retaining its stability and strength. The Medical Technologies IKC is working with Professor Russell to identify companies interested in licensing the technology.

Collagen could have further advantages, as Professor Russell explains: "As a chronic wound tries to heal, elevated levels of particular enzymes can degrade new tissue and keep the wound inflamed. Using collagen, we think the enzymes will be attracted to the dressing, rather than aggravate the wound, speeding up the healing process."

A wound healing study is due to start soon, to test the new dressing against commercially available benchmarks.

### Laser tooth repair in human trials

A means of restoring acid-eroded tooth enamel using synthetic calcium phosphate mineral and ultra-fast lasers is to undergo its first test in humans, as a key step towards clinical trials. The research, funded by the EU and EPSRC, brings together material scientists, dental researchers and physicists from the universities of Leeds and St Andrews, working with academic and industrial partners in Italy. The technology aims to restore tooth enamel, resulting in a surface that is harder and more acid-resistant than the natural enamel.

The team has been testing the technology using bovine tooth tissue samples and have successfully built layers of new 'enamel' to a thickness of one twentieth of a millimetre – similar to the natural layer of enamel on our teeth.

Professor Animesh Jha, from Leeds' Institute for Materials Research, who led the research, says: "The next step is to use in-situ test models developed at Leeds to test the material in humans, to see how it copes with the particular conditions and acidity in the mouth. The test models will remain in the mouths of selected volunteers for a week and the results will determine how quickly we can progress to clinical trials."

### Stem cells promote 'natural' knee repair

Guidance and funding from the Medical Technologies IKC has helped develop a prototype device aimed at improving the outcome for knee surgery patients by encouraging natural repair.

The device, designed to help knee joints repair themselves by releasing stem cells into the injured area, is about to go forward into its first clinical trial.

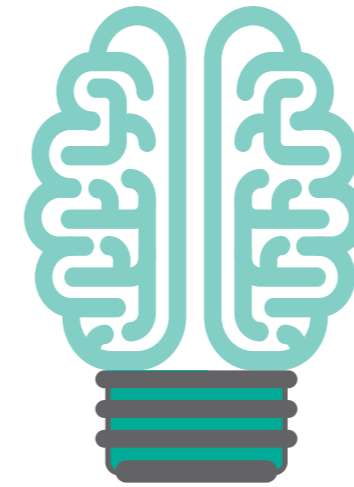
Developed by researchers and clinicians in Leeds, it works by mechanically releasing stem cells found in the synovial membrane in the knee. The device, used during arthroscopy by the surgeon, enables the cells to be detached from the synovium and released into the joint fluid, therefore becoming available to facilitate repair in damaged or diseased joint tissue. This is done at the same time as the patient undergoes joint repair surgery, avoiding the need for a second operation.

Dr Thomas Baboolal, post-doctoral research fellow in the Leeds Institute of Rheumatic and Musculoskeletal Medicine, explains: "Rather than removing these stem cells, growing them in the laboratory and then replacing them, we try to increase the number of regenerative cells within the joint at the time the patient is having surgery and leave them there to do their work."



# Supporting the skills pipeline

*within the medical technologies sector*



In the last twelve months, the work of the Medical Technologies IKC to support skills development within the medical technologies sector has gathered even greater momentum. Two of our initiatives designed to foster innovation and develop skills to support the sector have been taken up within the University of Leeds and broadened out to other scientific disciplines.



To find out more information about skills pipeline please visit:  
[medical-technologies.co.uk](http://medical-technologies.co.uk)

Our collaboration with Leeds University Business School (LUBS), which saw the creation of a Postgraduate Certificate in Innovation Management, has enabled LUBS to strengthen its capacity in this area. The insights gained by LUBS researchers are integrated into a new MSc in Global Innovation Management, particularly into two modules: Managing for Innovation and Innovation Management in Practice. These modules are also followed by students from the Centre for Doctoral Training (CDT) in Tissue Engineering and Regenerative Medicine, and by doctoral students from other disciplines, including Medicine, Engineering and Earth & Environment.

The Career Architect programme was developed and piloted by the WELMEC Centre of Excellence in Medical Engineering in collaboration with the Medical Technologies IKC, the University of Leeds' Staff and Departmental Development Unit and Career Management Coach, Ruth Winden. It has now supported 24 post-doctoral researchers to further their careers beyond academia, helping to retain key skills within the sector. The University of Leeds is now rolling this programme out to post-docs in other disciplines within science, technology, engineering and medicine – all sectors which also suffer from a skills shortage. The programme has also been adapted for doctoral students, taking account of their different position on the career ladder, to help them progress from their PhDs into the workplace.

## YES to enterprise

Expert advice and support from the Medical Technologies IKC helped a team of four University of Leeds post-doctoral researchers to win the Chemistry Young Entrepreneurs Scheme (YES), securing them a place in the 2014 final of Biotechnology YES. The scheme is designed to raise awareness of the commercialisation of bioscience ideas among early career researchers.

Teams are asked to develop a business plan for a hypothetical bioscience start-up company needing early stage investment and then pitch this to a group of venture capitalists. The Leeds team – comprising Danielle Miles, Sami Tarsuslugil, Hazel Fermor and Anthony Herbert – 'created' a spin-out company based on using patented self-assembling peptides as a slow-release drug delivery platform.

Danielle and Hazel were also studying for the PG Certificate in Innovation Management, co-designed by the Medical Technologies IKC and Leeds University Business School.

"I was able to put into practice the theory we'd been learning, particularly in terms of management skills and style," says Danielle. "Even though we didn't win the overall final, it's been a really useful experience and I'm still benefiting from it now. My knowledge of patents, markets, clinical need, mapping patient pathways and regulation hurdles is going to stand me in good stead in the future."

## Skills awareness

Post-doctoral researchers have incredibly valuable skills and experience that they are usually unaware of, says Career Management Coach, Ruth Winden, who co-developed the WELMEC and Medical Technologies IKC Career Architect programme with Patricia Gray from the University of Leeds Staff and Departmental Development Unit and Director of Innovation, Dr Jo Dixon-Hardy.

“Medical technologies is a growing sector and Leeds post-docs have skills that are very much in demand,” says Ruth. “It’s a competitive market, but they have a real advantage, as they have spent many years working in a highly regarded institution with some of the top people in the field. A key aspect of the programme is helping them recognise what they have to offer outside academia and building their awareness of the careers that are now open to them.”

Working on such a personalised support programme, which includes one-to-one coaching sessions, means Ruth gets to know those taking part very well. “They are a joy to work with, as they are such highly motivated people,” she says.

## Clinical perspective

Spending two weeks shadowing surgeons at Leeds General Infirmary was a fascinating and educational experience for doctoral student, Joe Collier. Joe took part in the pilot ‘clinical immersion’ scheme, run by the Medical Technologies IKC, at the end of his second year within the DTC in Tissue Engineering and Regenerative Medicine where he is undertaking a PhD focused on soft tissues in the knee.

“It was a real privilege to have access to the operating theatre and see surgeons at work,” says Joe. “It made me realise the kind of pressures they’re under and the challenges they face. We try and design medical products to be standardised in engineering terms, but surgeons have to adapt them to each individual patient.”

As well as observing both orthopaedic and cardiovascular surgery, Joe sat in on consultations, followed the surgeons on their ward rounds and was shown the hospital’s new cardio-physiology facilities.

“It made the research I’m doing much more real, when you see the impact it could have for surgeons and their patients,” says Joe. “Our work within the Institute of Medical and Biological Engineering aims to make a surgeon’s job simpler, by making products that are better and easier to use.”

## Strategy for skills

The Science Industry Partnership (SIP) is a skills programme led by employers for whom science and technology is critical to their success. Through our strategic partner, Regener8, the Medical Technologies IKC has an input into the working group tasked with ensuring the programme provides appropriate support for the medical technologies business community. The programme covers apprenticeships, traineeships and provides funding for SMEs to help cover the costs of in-work training.

Operations Director of Regener8, Dr Mike Raxworthy, who sits on the Medical Technology Skills Working Group, explains: “Our role is both to ensure the programme is meeting its targets and make sure businesses are aware of the opportunities it provides. This year we’ve increased the amount of funding available to SMEs for in-work training, raising the maximum cost to £1,500 of which up to 50 per cent can be claimed back.”



## Moving on up

Many of the post-doctoral researchers who have followed the Career Architect programme, developed by the Medical Technologies IKC in collaboration with the WELMEC Centre of Excellence in Medical Engineering, or received other career transition support, have gone on to gain new positions within the medical technology sector. Developed and piloted in-house, the Career Architect programme is designed to equip researchers with career management skills that will position them for fulfilling careers that make full use of their skills and experience.



**Daniel Binks**

**Current position:** Associate Medical Writer with McCann Complete Medical, Macclesfield  
**Was:** Post-doctoral researcher within WELMEC  
**Research area:** the use of MRI to detect early signs of osteoarthritis

“The Career Architect programme helped me understand what I wanted in my career, what I was good at and how to bring those two elements together. I was already interested in scientific writing, but the programme helped me hone in on my most relevant experience and shape that into a good application and interview. In particular it helped me see the value of having worked in a multi-disciplinary environment like WELMEC and what that experience could offer to potential employers.”



**Amit Pujari**

**Current position:** Clinical and Research Engineer, Queen’s Medical Centre, Nottingham.  
**Was:** Post-doctoral researcher within the Institute of Medical and Biological Engineering (iMBE)  
**Research area:** simulation protocols for total joint replacements of the knee

“The team that runs the Career Architect programme is amazing and they do a great job. When you work in academia, you’re rarely aware of all the other career opportunities that are available, especially those outside academia. The programme helped me to discover where my interests lie, what my strengths are and what options were open to me. There aren’t many programmes that help to guide you like this and give you the practical tools to make it happen.”



**Sami Tarsuslugil**

**Current position:** Bioengineer, DePuy Synthes, Leeds.  
**Was:** Post-doctoral researcher within iMBE  
**Research area:** Osteoarthritis, trauma and disc regeneration in the spine

“Once I’d made my decision to move on from academic research to a position in industry, the team at the Medical Technologies IKC provided fantastic support, helping me to sort out my CV, look for secondments to gain industry experience and prepare for interview. The expertise the IKC team shared with us to prepare for the Biotech YES competition (see page 15) was also a great help as it gave me an understanding of how businesses run and the regulatory environment. So much of how the medical technology sector works is governed by regulation, so gaining that knowledge has been invaluable.”

## Building a med tech community

The Medical Technologies IKC works with a UK-wide community of partners from across the regenerative devices sector, brought together by our strategic partner Regener8. Collaboration with programmes such as the Centre for Doctoral Training in Tissue Engineering and Regenerative Medicine and MeDe Innovation, enables connections to all aspects of the sector: clinical application, sector-specific skills training, manufacturing, intellectual capital and innovation translation – all grounded in the world class research base within our partner universities.

### MEIBioeng15

MEIbioeng15, the national biomedical engineering event for the UK, was held at the University of Leeds in September 2015. Bringing together biomedical engineers and scientists, bioengineers and medical engineers from academic centres and the med tech industry, the conference included IKC-led tracks on regenerative devices; careers, outreach and policy; musculoskeletal biomechanics and tribology; and the delivery of regenerative medicine (organised by Regener8).

### Early Career Researcher Forums

Over 125 PhD students and Post-Doctoral Research Assistants (PDRAs) are involved in Regener8’s early career researcher (ECR) membership stream. Alongside MeDe Innovation’s ECR network, Regener8 organises company visits for ECRs to gain insight into the med tech industry. In the last 12 months members have visited global medical device company, Smith & Nephew, MedTech SME Xiros, and the Cell Therapy Catapult in London.



The Medical Technologies IKC team

### Regener8 Annual Conference 2014

Around 150 delegates from industry, academia, clinical medicine and government agencies attended the 7th Regener8 Conference. Keynote speakers included Chair of the Biomedical Catalyst Awards Committee, Dr John Stageman, and Scientific Director for Allogeneic Cell Programs at TiGenix, Eleuterio Lombardo. Innovate UK’s Director of Technology and Innovation, Kevin Baughan also presented.

### Careers and Industry day

Eighty PhD students and PDRAs from across Regener8’s academic partner network attended a careers meeting, organised with the Centre for Innovative Manufacturing in Regenerative Medicine in February 2014. Speakers gave inspiring talks on how they’d transitioned from academia to other organisations in the regenerative medicine sector and careers specialists and industry mentors provided advice on CVs. A second event will run at MEIbioeng15.

### External Advisory Board

The Medical Technologies IKC benefits from an External Advisory Board drawn from across the medical technology sector, with members coming from both academia and industry. Chaired by Professor Christina Doyle, Director and CEO at Xeno Medical Ltd, the Board helps to shape and steer our strategic direction, playing a key role in advising on sustainability. We would like to thank the Board for their efforts over the past twelve months, in particular their support in leveraging our additional funding.



To find out more about our team please visit:  
[medical-technologies.co.uk](http://medical-technologies.co.uk)

# Medical Technologies

INNOVATION AND KNOWLEDGE CENTRE

**EPSRC**

Pioneering research  
and skills



**Innovate UK**  
Technology Strategy Board

**For more information please visit:**

[www.medical-technologies.co.uk](http://www.medical-technologies.co.uk)

**or get in touch:**

+44 (0)113 343 0923

[med-tech@leeds.ac.uk](mailto:med-tech@leeds.ac.uk)