LIRC

London Implant Retrieval Centre

An independent research collaboration in partnership with UCL and the Royal National Orthopaedic Hospital

LIFE-CHANGING EVIDENCE

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www.lirc.co.uk

WE'VE SHOWN THE WORLD THE VALUE OF ANALYSING THE FAILED MEDICAL DEVICE ...

"The unique combination of skills and facilities at LIRC has enabled us to revolutionise the assessment of failed medical devices. We have surgeons, engineers and researchers all working together, equipped with precision measuring equipment and located right within the Royal National Orthopaedic Hospital. It means we're constantly in touch with patients, who play an active role in sharing their experiences and shaping the direction of our work.

Harry Hothi

RESEARCH ENGINEER

The London Implant Retrieval Centre began in response to a very real problem. In 2006, in our work as orthopaedic surgeons, John Skinner and I began to notice how many patients with Metal on Metal (MOM) hips were getting unexplained pain severe enough to need 'revision' surgery — in other words removing and replacing the original implants. This type of surgery is often challenging: cobalt and chromium released from the MOM hip replacements can cause irreparable damage to the muscles and ligaments of the hip joint.

This experience led us to create LIRC in 2008 —the first global retrieval programme for medical implants — with the aim of radically improving clinical outcomes for patients undergoing hip replacements and revision surgery

We knew from the start that, to make a valuable impact with our research, collaboration would be key. But I don't think we ever imagined what an exciting partnership would evolve, with surgeons, engineers, researchers and healthcare professionals all working together towards common goals - or that our work would extend to so many other types of implants, including knee and spine.

This booklet explores our model for bringing about real, positive change — within our profession, across the wider industry, and most importantly, to the lives of patients. There are tremendous opportunities ahead for research that makes an impact, and whether you're a patient or a practitioner, I hope you'll be inspired and want to get involved.

Professor Alister Hart

CO-FOUNDER AND DIRECTOR
CONSULTANT ORTHOPAEDIC SURGEON

THE LONDON IMPLANT RETRIEVAL CENTRE IS...

The world's **LEADING SOURCE** of analysis of failed orthopaedic implants

All about different **DISCIPLINES WORKING TOGETHER**

Driven by **A CORE TEAM** of surgeons, engineers, imaging scientists and healthcare professionals

Equipped with **STATE-OF-THE-ART** measurement machines

Based at the **LARGEST ORTHOPAEDIC HOSPITAL** in the UK

Supported by a **GLOBAL NETWORK** of more than 200 collaborators and 500 contributors from 25 countries

PROVIDING INSIGHT for leading hospitals around the world

Enabling **SAFER, BETTER-INFORMED AND MORE INNOVATIVE** orthopaedic care

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SINCE 2007 WE HAVE...

Collected **6,000** components

Published **70** full journal articles

Given **25** presentations at the American Academy of Orthopaedic Surgeons

Been endorsed through major awards and prizes, and **£5 MILLION** in funding

Shown at exhibitions attended by more than **350,000** medical professionals

...and **50,000** members of the public

Hosted more than **40** student placements

OUR IMPACT IS SEEN IN...

A BETTER QUALITY OF LIFE for patients among the 1.5 million around the world with metal-on-metal hip replacements...

...with similar quality of life benefits expected for all hip, spine and knee implants.

NEW TECHNIQUES for managing patients' hip replacements, such as levels of blood metal ions, the award winning MARS MRI protocol, and informing surgeons how to correct the failed implant.

EVIDENCE that has helped manufacturers while supporting patient claims.

GUIDANCE for surgeons worldwide on which implants perform best.

EDUCATIONAL RESOURCES for surgeons in training, experienced hip surgeons, and patients wanting to know more about their implants.

EVIDENCE FOR SAFER DESIGN

Like a black-box flight recorder, a failed implant holds data that can reveal causes of failure – and how to prevent them.

Our job is to unlock this data and make it useful. We bring together surgeons and engineers and, working closely with patients we conduct forensic investigations into the failed implants, comparing our findings with those for well-functioning implants.

Through our reports, journal articles, public information resources and direct face-to-face advice, we help patients, hospitals, health improvement bodies and all other stakeholders to benefit from safer, better-informed and more innovative orthopaedic care.

www.lirc.co.uk

OUR APPROACH : A MODEL FOR RESEARCH IMPACT

Our open, collaborative way of working has enabled us to have a tremendous impact on the way orthopaedic implants are understood and used, and on the lives of patients who make use of them.

London Implant Retrieval Centre grew out of a simple research goal: to collect failed hip implants and investigate the causes of failure, so lessons could be learnt for future patients. Working out what leads to success or failure involves unravelling the complicated relationship between implant design, surgical practices and differences between patients.

With the LIRC we've proved a new kind of model for orthopaedic research. We're different because we:

- bring together surgeons and engineers
- work closely with patients
- fund ourselves through a consortium of orthopaedic manufacturers
- make our published work freely available

WE'RE FUNDED BY MANUFACTURERS - SO HOW DO WE STAY INDEPENDENT?

The money that pays for LIRC is provided strictly on terms that give us full freedom to investigate anything we choose, and to publish our findings. We've maintained this freedom from the start, when nine different manufacturers agreed to provide funds for us to set up. Like any independent laboratory, we have clear guidelines for impartiality, and if there's a potential conflict of interests we put special measures in place. For example, when looking at disputed cases we may conduct 'blind' tests and send our findings to all relevant parties.

A TRUSTED SOURCE OF CLINICAL ADVICE

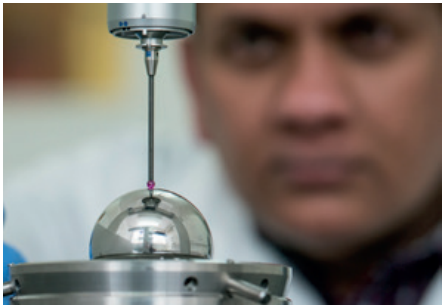
Since 2008 we've gained considerable knowledge and experience from our work, which has enabled us to provide expert opinion on key questions about hip and knee implants. How can we make them function as long as possible? What's the best way to position them in the body? Which designs perform best? And what activities should patients do and avoid? Our opinions benefit patients and also help implant manufacturers and legal bodies. By remaining independent and impartial we can support all parties in resolving failed implant issues. LIRC is the independent global retrieval centre for the analysis of the recalled DePuy ASR, Stryker Rejuvenate and ABG II implants.

REPORTING ON THE CAUSES, CASE BY CASE

We provide reports on failed hip replacements that help surgeons, patients, lawyers, manufacturers and healthcare regulators understand why the failure occurred. In a similar way that an aircraft black-box helps isolate the causes, the retrieved implant helps trace the cause to surgery or manufacture. We prepare our reports using state-of-the-art measurement machines that follow international standards. We use custom-made computer software for three-dimensional shape processing. All of our methods are published in peer reviewed, international medical and engineering journals.

BECAUSE WE WANT TO DISCOVER WHY

Research is what drives us. By uncovering the reasons for good and poor performance of hip and knee implants, we can improve their design and use. We are surgeon-led and have world-class engineering expertise. LIRC is based on a university hospital campus that is globally recognized as a leader in orthopaedics and implant research. We have published 50 papers in the past 50 months with 150 co-authors. These papers have been downloaded 1000 times in 20 countries and have been cited by other researchers more than 1000 times.



DISCOVERIES WORTH SHARING...

We can make a valuable impact by raising awareness about causes, effects and wider issues associated with joint replacement. Our work is shared through a range of educational resources offered by charitable and regulatory organisations. We're been widely covered in the media, with features on Newsnight and BBC online, and articles in the Daily Telegraph, Daily Mail and Guardian.

www.lirc.co.uk

RESEARCH IMPACT: CHANGING HEALTHCARE

IMPACTING CLINICAL PRACTICE: NEW TECHNIQUES

Our work has led to significant changes in the way our profession practices joint replacement surgery and manages patients. By identifying factors that can determine whether a patient will have problems with a Metal on Metal (MOM) hip, such as hip size or the patient's age and sex, our research has helped reduce the risk of failed hip replacements.

We've been able to identify the precise level of metal ions in patients' blood that marks the cut-off between poor and well-functioning hips, and this has enabled clear and simple testing for patients.

Meanwhile, by looking at the 'shadow' a metal implant causes in the tissue around it on MRI (Magnetic Resource Imaging) scans, we've made it easier to test for inflammation and muscle damage. These findings have shaped a new testing procedure, set out in the award-winning MARS (Metal Artifact Reduction Sequence) MRI protocol.

Both these tests were unavailable in all NHS hospitals in 2006 and are now routine. The MARS MRI protocols in particular have cut the number of unnecessary operations to try and repair implants, while reducing delays to those operations that are urgently needed to prevent irreversible muscle damage.

The economic impact of these changes is far-reaching. With surgery costing more than £10,000 a time there are large savings to be made just by avoiding unnecessary operations. Meanwhile, shorter waiting lists for necessary repair surgery gets patients back in action more quickly, reducing the burden of care.

IMPACTING INTERNATIONAL HEALTH POLICY: NEW REGULATIONS

Our research identified a level of seven parts per billion as an important cut-off in the blood levels of metal ions between poor and well-functioning hips, and this has become a standard for clinical guidance globally.

It was first adopted by the Medicines and Healthcare Products Regulatory Agency in 2010. NICE (the National Institute for Health and Care Excellence) updated its recommendations for hip replacement surgery in February 2014, ruling out the use of most types of MOM implant in the UK.

Meanwhile international health regulatory agencies and professional bodies, including the US Food and Drugs Administration, Australian Therapeutic Goods Association and American Association of Orthopaedic Surgeons have used the research to create their own recommendations affecting many of the 1.5 million patients worldwide with MOM hips.

The research has influenced a change in the regulation of all metal-on-metal hip devices in the United States and United Kingdom, with greater scrutiny of all orthopaedic implants before devices are approved for use: never again should there be a medical implant disaster of the scale seen as a result of MOM hips.

> “The evidence we’ve gathered has directly affected UK and US health policy and led to changes in clinical practice, implant design; procedures for monitoring, management and safety, and approaches to care for 1.5 million MOM hip patients worldwide.”

Mr John Skinner

CO-FOUNDER AND DIRECTOR
CONSULTANT ORTHOPAEDIC SURGEON

> By showing exactly why joint replacements fail, our work is helping to make sure every patient gets the right treatment, while giving those who've had the wrong treatment a better chance of getting their lives back on track.

Mrs Gwynneth Lloyd
PATIENT ADVISER

RESEARCH IMPACT:
A BETTER QUALITY OF LIFE

Our findings are enabling informed decisions on the best treatment for patients. Replacing failed MOM hips with a ceramic-based implant brings relatively rapid relief of pain and excellent chances of returning to an active, healthy life.

Meanwhile our evidence has been used to support patient claims against manufacturers of faulty implants. Worldwide, litigation cases against health providers have raised billions of dollars to pay for compensation and earlier-than-expected operations to replace failed implants.

The quality-of-life benefits of our work have helped stimulate a wider global retrieval programme for medical implants, including a major analysis programme funded by Johnson & Johnson.

PEOPLE FIRST

LIRC exists above all to make life better for people with painful joint replacements. By working closely with patients we get to see everyday what a real and practical difference our research can make.

Nicola had revision surgery for a failed MOM hip in 2007. She says:

"Seven years down the line I'm back to walking my beloved dogs, cycling to work every day, swimming and playing with my granddaughter; something I never thought I'd be able to contemplate. Sure, I still have osteoarthritis in my other joints, and I know I'll probably have to face more surgery eventually, but the revision surgery has given me my life back, bought me so much more time, and made my other joint problems more bearable."

Nicola Niechihal

We hold regular open days at LIRC, giving patients a chance to find out more about our work, give feedback, and share experiences with each other.

DIFFERENT SPECIALISTS WITH A COMMON PURPOSE

Our core team includes surgeons, engineers, researchers and healthcare professionals with highly equipped facilities at Royal National Orthopaedic Hospital, Stanmore.

Our broad capabilities make us versatile and highly productive in tackling different research challenges, and we publish a new paper approximately every month.

ALL WORKING TOGETHER

We're all about partnerships: a multi-disciplinary team working closely with patients, funded collectively and supported by a worldwide network of contributors and collaborators.

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A WORLDWIDE NETWORK FOR BRINGING IN THE EVIDENCE

Our work depends on having relevant evidence to analyse, in the form of failed surgical implants. We receive these from more than 500 different contributors across 25 countries.

We're currently running spine, hip and knee research projects. If you're an orthopaedic surgeon we need you to contribute components for analysis.

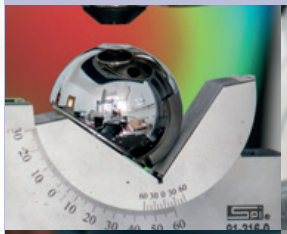
TO FIND OUT MORE VISIT:
lirc.co.uk/contributing-evidence
email: **info@lirc.co.uk** or give us a call.

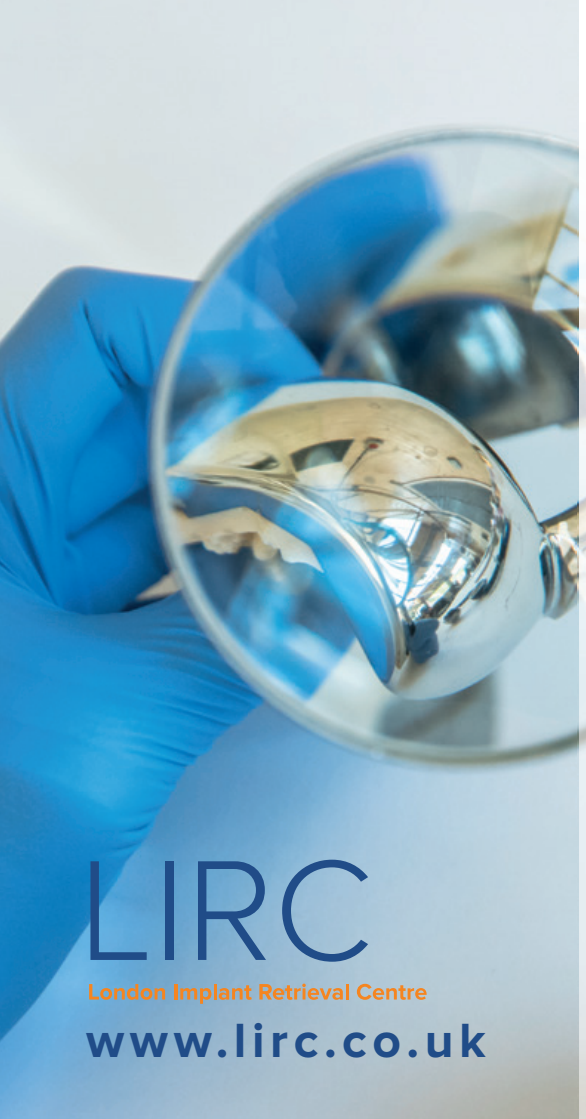
HIPLINK: BUILDING A MORE CONNECTED PICTURE OF JOINT REPLACEMENT PERFORMANCE

National Joint Registry (NJR) has collected data on more than 1.8 million operations. By connecting our large database with that of the NJR and running a validation process, we've been able to cross-check the accuracy of NJR reports. In doing this we've provided assurance on the accuracy of NJR reports and created a new way for surgeons, manufacturers, hospitals and patients to assess the quality of data on implant performance.

EQUIPPED FOR COLLABORATION

We have dedicated laboratories and offices, and full onsite provision for secure and tracked implant storage. Our lab space houses state-of-the-art measurement machines to quantify surface damage in all orthopaedic implants, such as the bearing and taper surfaces of hip replacements and the polyethylene components used in knee implants. With our facilities and expertise, we're equipped for gathering evidence on a whole range of joint implants.





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FUTURE IMPACT

In recent years we've seen a dramatic rise in expectations about what technology can do when human joints fail. Patients want implants that last forever and enable them to go windsurfing, climb ladders or run a marathon. Manufacturers compete to find innovations that will meet the demand and surgeons must keep up with the pace of change.

Yet it remains hard to predict how an implant will behave. There's no substitute for long-term clinical observation, but the next best thing is very detailed follow-up in the short-term.

Our work in analysing failed implants is one part of an early warning system for complications following replacement surgery. Such measures won't predict the future, but can help make sure that the suffering caused by widespread failure of MOM hips will never happen again.

Having proved the value of analysing failed hip implants, we've now broadened the scope of our research into other aspects of lower limb joint replacement, including spine and knee implants.

We work with Beyond Compliance to help support the development of new joint replacement technologies while at the same time protecting patients. By continuing this work we can enable safer innovation, while increasing quality and confidence in orthopaedic care.

ARE YOU AFFECTED BY JOINT REPLACEMENT?

LIRC began because we wanted to find out why people were suffering from painful hip replacements, and we've continued working closely with patients, together uncovering ways to achieve better care.

If you're a patient we'd love to hear from you.

GET INFORMATION

Learn the types of orthopaedic implants, the anatomy of a hip or knee joint, and what to expect during and after surgery.

FIND OUT MORE AT:
lirc.co.uk/patient-information

GET INVOLVED

Visit us during one of our open days; help critique our research and information, and work with us to shape our plans for the future.

FIND OUT MORE AT:
lirc.co.uk/patient-involvement

GET IN TOUCH

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