Leicester Cardiovascular Biomedical Research Unit

NHS National Institute for Health Research

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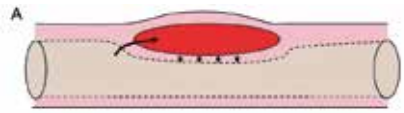
Spontaneous Coronary Artery Dissection

Spontaneous coronary artery dissection (SCAD) is a rare condition that typically affects young, healthy people, whose first presentation is often with an unexpected heart attack.

It is thought to result from blood accumulating in the wall of an otherwise healthy blood vessel, forming a bruise as shown in the image below.



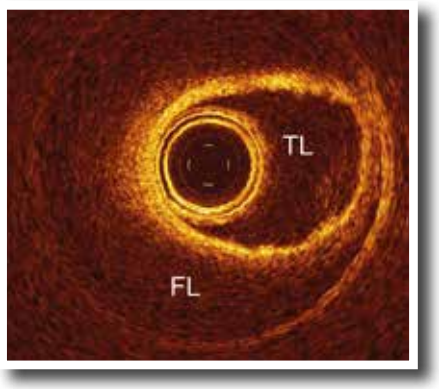
Calcium and white blood vessels sometimes stick to the bruise. The bruise then ruptures, releasing a blood clot and sometimes calcium and white blood vessels into the blood stream, which can cause a heart attack.

SCAD can also cause a flap of tissue from the blood vessel lining to come loose and block the blood vessel, which causes a heart attack. This can occur with or without a bruise.

New imaging technology, which allows us to scatter a laser inside the blood vessel and interpret the signal reflected back, means we can now see the bruise inside the blood vessel. This technology is called optical coherence tomography (OCT). On the OCT image shown here, the shape of the inside of the blood vessel is much clearer than older technologies which used sound to produce an image. The wall of the blood vessel is labelled TL (the medical term for the wall of a blood vessel is *lumen* and this is the *true lumen*) and the bruise which distorts the wall is labelled FL (*false lumen*).

SCAD is a poorly understood condition, and a group of patients who have experienced it have worked together to drive the research agenda in the UK. The Leicester Cardiovascular Biomedical Research Unit is proud to have been approached by this group about establishing a UK research project to complement the work of the world-renowned Mayo Clinic in the USA. Dr David Adlam will lead this work locally.

'We are excited by this developing partnership between the Leicester Cardiovascular BRU and the Mayo Clinic to advance our understanding of this condition. This research programme has been driven by patients who have this condition but for years have been frustrated by a lack of meaningful research into SCAD resulting in a dearth of information on effective treatment and prognosis. The UK SCAD patients have been directly involved in setting up this programme and will be key to its continuing success. ' Dr David Adlam



Images taken inside a blood vessel using new imaging technique Optical Coherence Tompgraphy

On the 4th July 2013 a group of UK patients who had experienced a spontaneous coronary artery dissection came to the Unit to share their experiences of the condition and discuss research plans including work with our expert in-house Informatics Team on developing a website. This will enable patients to express an interest in taking part in research projects and provide information about the condition and access to peer support. A further meeting is planned for August. Our visitors also enjoyed a brief tour of the Unit's facilities with Dr Adlam.

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"When I first started researching SCAD after my heart attack in March 2012, there were far more questions than answers. It was a frightening time. However, there was hope. The Mayo Clinic had just started some research and the American non-profit SCAD Research, Inc. had recently formed to raise awareness of SCAD and fund the research. To now have the Leicester Cardiovascular BRU on board is an amazing step forward in the research programme and our quest for answers." Rebecca Breslin

"Two years on, there is much more information available, but we need answers! I have fully recovered and have no on-going health issues. However, it's always in the back of my mind, so I'm very excited that research is being done into the causes of SCAD." Debbie Oliver

"As SCAD survivors we are too young to live the rest of our lives without knowing why. The BRU have shown respect for our dream of finding answers and I thank them for that. The excitement is spreading like wildfire amongst us! We are so pleased that there will be research in the UK!" Louise Pearson

Patients who initiated the SCAD research project in the UK visiting the BRU facilities with Dr David Adlam

Leicester Cardiovascular BRU Welcomes **Professor Gavin Murphy**

The Unit is delighted to welcome another British Heart Foundation (BHF) Professor to the team.

Gavin Murphy is interested in the injury caused by damage to organs, especially the kidneys, after a heart operation; a leading cause of death after cardiac surgery. As a British Heart Foundation Professor, all of Gavin's work is funded by the donations of members of the public.

As many as 30% of people who have a heart operation suffer organ failure as a consequence of the trauma and stress their body experiences during surgery, according to the BHF. The research that Professor Murphy will pursue at the Unit has potential to make a significant impact on the wellbeing of patients who need to undergo surgery.

"The British Heart Foundation is a charity and the leading funder of high quality research into cardiac disease in the UK. Our research would not be possible without help from the public. We hope to widen patient and public participation in our cardiac research programme, to increase its relevance to patients and to increase awareness of the advances that have been made in cardiac surgery over the last decade." Professor Murphy.

If you would like to hear more about Professor Murphy's work, you are welcome to attend a public lecture on October 16th. Details can be found on the University of Leicester website or obtained from Veerle Verheyden on vw46@le.ac.uk or 0116 256 3039.

http://www2.le.ac.uk/news/events/2013/october/improving-patient-outcomes-in-cardiac-surgery

Genetic **Research**

People in Leicester attending their GP Practice for an NHS Health Check have been offered to chance to help us with our research by having a little extra blood taken for genetic analysis and allowing us to check their medical records in the future to see if they develop cardiovascular disease.

So far over 2000 people have taken part in the Genetics and Vascular Health Check (GENVASC) study, and more than 100 people are volunteering every week. Over the next few months, people in West Leicestershire will also be asked if they can support our research. Look out for our posters in a GP Practice near you!

The hospital based tissue banking project, which asks patients seeing their consultant to give us samples of blood and urine, plus information about their current and future health has now been supported by nearly 4000 patients, with around 300 people coming forward to help every quarter.

Cardiac Research: **The Next Generation**

The Leicester Cardiovascular Biomedical Research Unit doesn't just do exciting research that will transform care for patients with heart illness; we also train the next generation of researchers through our teaching programmes.

There are currently 12 students working within the Cardiovascular Biomedical Research Unit.

Fred came to the Unit from Belgium, and is passionate about cardiology because of his family history of heart illness. He's a PhD student investigating what causes disturbance in the rhythm of the heart using high resolution echocardiograms (ECG) where lots of stickers and leads are applied to the chest. With these tools, it is possible to diagnose very local disturbances in heart activity from the surface of the torso without the need for invasive electrophysiological (EP), examination where wires are inserted into the heart to record its electrical activity. In the future, this system could be used in clinic. Since it is non-invasive, it would reduce the risks for the patient compared to invasive EP studies as well as the costs for diagnosis and treatment.

"The BRU and University of Leicester gave me the opportunity to intensively study many aspects of these disorders, both from a clinical as well as engineering aspect. The possibility to work together with top-rated cardiologists and engineers continues to improve my knowledge. During the project, I have had the chance to work together with many people in a friendly and supportive environment. The BRU has been very helpful in many aspects of my project. Their active engagement in the study and quick help has been an important factor in letting the project run smoothly." Frederique Vanheusden.

Jamal is interested in the ways we can image the heart, particularly the use of magnetic resonance imaging (MRI). He is an MD student, working with Professor Anthony Gershlick and Dr Gerry McCann, who manages a number of cardiac imaging studies. Jamal works on a very large study, exploring how we manage patients who have a heart attack in which several blood vessels supplying the heart are blocked. The study uses MRI to measure the success of different treatment strategies to see which approach works best and has recently finished recruiting participants. In the last year of his studies with us, Jamal will work on analyzing the data to help develop guidelines for the treatment of this type of heart attack before returning to his last 2 years of clinical training.

"My aim was to secure an MD research post within a prestigious cardiovascular research unit that would provide me with experience in Cardiac MRI working with one of the UK's biggest names in this field. I have enjoyed my time working in the Cardiovascular Sciences Department. I feel well-supported by my supervisors and have had access to state of the art Cardiac MRI research scanners and analysis tools. I am confident that this venture will greatly benefit me in my intended future role as a Consultant Cardiologist with Specialist Interest in Cardiac Imaging." Jamal Khan.

Like Fred, Nikil is a PhD student. Nikil is looking into causes of brain injury during cardiac surgery and how pieces of debris and air bubbles entering the brain during surgery can have an impact on the neurological (brain) outcome in cardiac surgery patients. Prevention and treatment of neurological complications remains a challenge in the management of patients undergoing cardiac surgery, with complications ranging from cognitive impairment to stroke. Although the causes of brain injury during surgery are currently unclear, they are generally thought to be due to emboli (solid particles or air bubbles) entering the circulation, which may become lodged in the blood vessels to the brain causing tissue damage and stroke.

"The NIHR Leicester Cardiovascular Biomedical Research Unit (BRU) has so far provided me with an enjoyable, dynamic and exciting working environment, full of enthusiastic people with a positive attitude towards health research. My decision to study at the Leicester BRU reflected on the fact that it is known nationally as well as internationally for its strong programmes that integrate teaching with high impact research." Nikil Patel.

Nikil also benefits from the Unit's strength in imaging research, investigating brain injury using Transcranial Doppler (TCD), ultrasound and Magnetic Resonance Imaging (MRI), as well as neuropsychological testing on patients undergoing cardiac surgery.

Nikil additionally benefitted from attending the National Institute of Health Research (NIHR) training camp in Ashridge with his colleague Gavin Chu.

"From a personal perspective, I feel academia is not always the easiest path, but this type of training and support makes the process far easier. I feel communicating our research to the public and media is one of the greatest challenges we face, and the NIHR training camp tackled this head on. The speakers gave us truly inspirational advice which made this an invaluable and motivational experience." Nikil Patel

Research on the Road

The Cardiovascular Biomedical Research Unit has been out and about in the community over the last few weeks, including at the Belgrave Health Fair on the 18th May 2013, which was attended by over 2000 people. We have also attended the International Clinical Trials Day at the Leicester Royal Infirmary, Loughborough Hot Road Show and the Mallory Mile Cycling Event. The Cardiovascular Biomedical Research Unit is committed to creating opportunities for the public to talk to us and ask about the research we do.

As well as attending public events, representatives from the Unit supported an event organised by the local CLAHRC (Collaboration for Leadership in Applied Health Research and Care), a part of the research arm of the Department of Health, which aims to identify local priorities for involving patients and the public in research. The event was hosted at Devonshire House and attended by a wide range of people including patients, carers, members of the public, researchers, healthcare professionals and people representing charities and patient groups.

The BRU Public Engagement Officer swapped her office for a London Transport Bus at a Hot Rod Show in Loughborough

New **Website**

The NIHR Cardiovascular BRU has a new website which can be seen at http://www2.le.ac.uk/projects/bru. The new website contains details of our major studies and stories from people who have taken part in them. There is also information on how to get involved in research, either as a participant in a study or by helping us design and manage our research projects.

Want to receive the newsletter regularly and express your views on cardiovascular research?

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Leicester Cardiovascular Biomedical Research Unit
Volunteer to join our research review panel.

Contact Rebecca on rp237@le.ac.uk for more information.

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