Unusually, the lecture took place at the QMRI rather than at the RSE, and was preceded by the presentation of the Sir James Black Medal to Professor Haslett.

Delivering the Sir James Black Prize Lecture, Professor Chris Haslett described his groundbreaking research into inflammation and explained the exciting potential of new forms of optical molecular imaging. He also spoke about the genesis and value of the Queen's Medical Research Institute, where the event took place.

Translational medicine works in more than one direction, explained Professor Haslett. It is often seen as going from the laboratory to the hospital ward, but research itself can be inspired by observations of what actually happens in patients, and the cycle continues back and forth, from bench to bedside and back again, ad infinitum. ‘The stimuli come from patients and their diseases’, he said.

Professor Haslett began by outlining the challenges of inflammation. Our inflammatory cells should protect us, but when they turn against us, that can be difficult to address. He described two forms of inflammatory disease: one where the disease resolves itself; and the other which does not resolve, and where the idea is to start treatment as quickly as possible before the inflammation causes irreversible damage. It’s like a spider’s web, he said: once it’s formed, it’s too difficult to attack; you have to get in early on.

He described cases of patients, one who had suffered trauma in a road accident, followed by a massive inflammatory response which could have killed him. Instead it resolved itself and he survived. Similarly he spoke of another patient, who was on a ventilator with acute respiratory distress syndrome, who recovered completely with no lasting damage to the lung. He also described how pneumonia gets better routinely, although it can be fatal in cases where it doesn’t resolve.

Finding out why and how these conditions spontaneously resolved could provide a window of opportunity for treatment, and potentially lead to new drugs. “But how do we learn about routine resolution?” he asked, answering that it was a case of turning to reverse translation. Looking at what’s going on at a molecular level can give valuable clues to what’s going on. The problem cells must be being cleared, but how?

He described how some of his early novel research on neutrophil clearance showed that it isn’t due to necrosis, as previously thought, but rather to apoptosis, leading to
macrophage ingestion of the neutrophils. Since then, there have been around 25,000 publications linking apoptosis with neutrophils, and much research has been done on this across the world.

Professor Haslett then described some other research being carried out to see if it is possible to promote apoptosis and drive clearance by macrophage – if this were the case, it should be potentially therapeutic, and provide a platform for new drugs. This has proven to be the case, he said, but work continues.

It would, however, be even better if treatment could start before the inflammation takes a proper hold. He spoke of the value of imaging in getting a better picture of what is happening, and to allow more timely treatment, but said that existing technology had its limitations. For example, PET scanners have poor resolution, are not widely available, and are not ‘bedside’ for patients.

He described the immense potential of optical molecular imaging – technology that is inexpensive and can be used where the patient is being treated. This issue with this technology is that it has poor tissue penetration, so researchers have been working to find a way of overcoming this with, for example, novel probes. He described work to create real-time bedside imaging using smart probes that essentially can get into tissue and provide immediate data that could help doctors diagnose and manage a number of serious conditions.

He spoke of Edinburgh Molecular Imaging, a spin-out company which is developing fluorescent imaging reagents that detect harmful processes at molecular level. Although the company – which recently received a £4 million funding boost from venture capitalists – is concentrating on lung conditions in the first instance, the technology potentially has applications in a wide range of other diseases.

Professor Haslett said that his vision of ‘hot imaging’ at the front door of hospitals was closer to coming to fruition, with concomitant benefits for patients and doctors. In essence, he said, the technology could allow doctors to see what’s happening at a molecular level within a minute or so of inserting a fibre. In this instance, the translation is due to a combination of the clinical and the commercial – and finding out more about the disease pathway is actually valuable in its own right.

This work is a very good illustration of why it is important that researchers and the patients they are ultimately serving are in close quarters. Professor Haslett spoke of his drive to ensure that the building of the new Royal Infirmary of Edinburgh at Little France did not mean an end to the valuable collaborations between the NHS and the University of Edinburgh. A fundraising drive followed, and the institute now stands next to the new Royal Infirmary, and as part of an exciting bioscience quarter. “We had concerns about moving the hospital away from the university and made our case for building a research institute at this site, with research relating to diseases”, he said.

The institute brings together the MRC Centre for Inflammation Research, the MRC Centre for Reproductive Health, the MRC Centre for Regenerative Medicine, and the Edinburgh University/BHF Centre for Cardiovascular Science. There are valuable synergies between the centres, he said. For example, inflammation is important in reproductive health, because the menstrual cycle involves an inflammatory event which resolves itself, every month. ‘There’s an added value in working together,’ he said.

He believes that imaging expertise and capability adds a valuable dimension to the institute, and will ultimately benefit patients. He spoke a little about the fight to ensure that the institute was built in an environment where public funding was incredibly hard to access. Several ‘big grants’ from major research funding organisations have helped make it possible, he said.
He also described the importance of getting just the right building for the institute, and paid tribute to the expertise of the architects involved. Scientists tend to think the most important thing is having lots of laboratory space, he conceded, but social space is also important. He pointed to the Drum café, where, he said, groups of people from different research groups gather and talk to each other. Arguably, he said, it’s one of the most important parts of the building.

“The QMRI never sleeps”, he said, adding that it is a busy place which has a key effect on the development of the Little France site. ‘I think this site will grow like Topsy,’ he said. ‘The future is bright – it’s all colours of the optical rainbow.’

Questions
Professor Haslett answered a number of questions covering topics ranging from the resolution of different types of inflammation to how to ensure the QMRI is sustainable.

Asked about getting the funding to make the institute sustainable, he said that it was already sustainable, but that he hoped that the momentum built on the developments in optical molecular imaging would continue. Getting investment from British venture capitalists was positive, he added.

Asked about why some cases of inflammation resolved and others didn’t, Professor Haslett said that we still don’t know why some things get better, and that there are a lot of conditions – for example, gout – where patients have episodes, then they get better.

Vote of Thanks
The Vote of Thanks was delivered by Sir John Savill, Chief Executive and Deputy Chair of the MRC, and Vice-Principal of the University of Edinburgh. He described the talk as a combination of originality, inspiration and persuasion – and said that description fits Professor Haslett too.