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Prospect of better bone disease diagnosis with new technology

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Scientists working on the Spatially Offset Raman Spectroscopy (SORS) technique at STFC's Central Laser Facility

Scientists and medics are set to test a unique technology which could help in the early diagnosis of conditions such as the painful brittle bone disease. The technology, which uses a novel technique devised by STFC's Central Laser Facility (CLF), is to be tested for the first time with NHS hospital patients.

The Spatially Offset Raman Spectroscopy (SORS) instrument, the first to be commercially available, is being delivered on Wednesday 3rd November to the Institute of Orthopaedics and Musculoskeletal Science, University College London (UCL) on the Royal National Orthopaedic Hospital (RNOH) site in Stanmore, Middlesex. The machine, which is being supplied by Cobalt Light Systems Ltd, will undergo testing to

assess its usefulness with the long term aim of developing a specialist medical device to diagnose and detect early signs of diseases such as brittle bone disease and osteoarthritis.

The instrument will be used to take measurements on volunteering patients coming in for routine appointments for specific bone disorders that have already been diagnosed. The measurements will test the way the technology works and the methods used for analysing the results. If successful, this could lead to preventive measures being taken at an early stage of disease development and the improved monitoring of the effects of treatments. At the moment brittle bone disease, a genetic bone condition, is often diagnosed after multiple painful fractures have already occurred to newborn babies.

The SORS technique was patented at STFC's Central Laser Facility (CLF) in Oxfordshire, and the instrument developed for bone scanning through collaboration with the CLF's spin out company, Cobalt Light Systems Ltd, and the Institute of Orthopedics and Musculoskeletal Science at University College London, one of the UK's specialist centres for bone disorders.

"This is a very important and exciting step in our research to use this science to develop a diagnostic technology that will allow simpler and more cost effective ways of diagnosing and treating people with painful and degenerative muscular skeletal diseases at a much earlier stage. Our aim is to enable treatment to be more effective in improving quality of life", said Professor Allen Goodship, Director of the Institute of Orthopedics and Musculoskeletal Science.

"The equipment uses the SORS technique noninvasively to safely determine the chemistry of bone tissue several millimeters beneath the skin", said RNOH Consultant Dr. Richard Keen. "This involves pressing a probe with a safe, low power laser beam gently against the skin in areas

where bone is mainly covered by skin. Many bone diseases arise because of subtle changes in the bone protein chemistry but these are invisible to conventional techniques like X-rays. The wonderful thing about the SORS technique is its potential ability to detect these subtle molecular changes. If successfully developed, this type of technology may reduce the need for additional, often invasive tests such as biopsies which could revolutionise the way we currently do our work."

This new study will establish the feasibility of development of this type of disease diagnosis on patients and, if successful, will pave the way for future patient clinical trials to validate potential wider applications such as screening for osteoporosis and connective tissue disorders.

"We are very excited about the further development of this new technology on patients for the first time," said Cobalt Light Systems' Chief Executive, Dr Paul Loeffen. "Since scientists at the CLF made the breakthrough in discovering SORS a few years ago, the team at Cobalt Light Systems have worked hard to develop and refine this technology. Now we'll start to see how the technique can make a real difference to peoples' lives. We'll be very busy in the next few years learning what we can from these tests so we can perfect the technology for wider use."

The SORS technique has further potential for applications such as research into drug delivery, the probing of pharmaceutical products through coatings and packaging for quality control, security screening, and the subsurface probing of paints and food products.

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