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Press release

Friedrich-Alexander-Universität Erlangen-Nürnberg
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Cooperation agreements, Research projects
Materials sciences, Mechanical engineering, Medicine, Physics / astronomy
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EU funding for developing a new type of X-ray microscope

When bones break more easily in old age, osteoporosis is often to blame. However, the cause of the disease and how it develops is not yet sufficiently understood. An interdisciplinary team of scientists at Friedrich-Alexander-Universität Erlangen-Nürnberg (FAU) and the Helmholtz Zentrum für Materialien und Energie in Berlin (HZB) is now developing a new imaging process to solve this problem and facilitate successful treatment more quickly. The aim of the new process is to enable x-ray microscopy to be carried out on living subjects. The European Research Council (ERC) is funding the project with an ERC Synergy Grant worth 12.3 million euros.

With life expectancy on the rise throughout the world, there has been a corresponding rise in the number of patients who suffer from osteoporosis. 27 million people suffer from the disease in Europe alone. The bone condition significantly reduces patients' quality of life and leads to high social costs. To improve treatment success, methods are required to analyse the changes to bone structure over time in more detail, especially on patients themselves. However, methods such as these have not been available before now, and certainly not any suited to being used for authoritative statistical studies on a large scale.

Research in several different dimensions

FAU researchers Prof. Dr. Georg Schett, Director of the Department of Medicine 3, Universitätsklinikum Erlangen, Prof. Dr. Andreas Maier from the Department of Computer Science 5 at FAU, and Prof. Dr. Silke Christiansen from the HZB are aiming to change this situation. 'We are seeking to revolutionise current knowledge about osteoporosis. To do so, we must improve our understanding of bone structure and anatomy', says Prof. Schett. The researchers plan to examine bones in detail at various macro and nano scales and observe how the structure changes over time under stress and after taking medication. The latter is only possible on a living individual. They are planning to develop a fast-scanning, low-dose X-ray microscope. The team will modify the hardware and software of an existing microscope from Carl Zeiss Microscopy by integrating a new high-performance X-ray source, an ultra-fast read-out detector and the latest machine learning methods for data evaluation.

'This will make it possible to assess the effects of ageing, hormone status, inflammation processes, medication or other forms of therapy on bones', says Prof. Schett. This method can also be used in applications other than medical research. It enables dynamic processes such as corrosion processes and microfractures to be monitored and documented in natural and synthetic materials. The project, known as 4D+nanoSCOPE, is set to receive funding worth a total of 12.3 million euros from the ERC over the next six years.

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