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Gegründet im Jahre 1869 von H. Hlasiwetz,
J. Loschmidt, J. Petzval und J. Stefan

EINLADUNG

zum Vortrag
von

DI Dr. Norbert Zöger

Technische Universität Wien,
Atominstitut der österreichischen Universitäten
über

Trace-Element Distribution in Normal and Arthritic Articular Cartilage

am
Dienstag, 15. April 2008, um 17.30 Uhr

Ort: Großer Hörsaal der Experimentalphysik, Universität Wien,
1090 Wien, Strudlhofgasse 4 / Boltzmanngasse 5, 1. Stock

Abstract:
Osteoarthritis (OA), a degenerative joint disease, affects more people than any other joint disease. Whereas the histological disease pattern, such as fibrillation of articular cartilage, clefting, cartilage loss, and tidemark duplication are well known, the role of trace elements (e.g. Pb, Zn and Sr) as well as their distribution osteoarthritic articular cartilage and subchondral bone is mostly unknown. In a recent study it could be demonstrated that the formation of tidemarks is accompanied by an accumulation of Pb and Zn in these zones of calcification in normal joint bones, having no macroscopical signs of OA. The role of the tidemark in OA and the specific Pb accumulation at this calcification front raised the question, whether the elemental distribution (especially the one of Pb) might be disturbed in case of OA.
Therefore synchrotron radiation induced micro X-ray fluorescence (SR µXRF) in confocal geometry (at HASYLAB beamline L and ANKA, Fluo beamline) has been used to study a set of bone/cartilage sample from patients with different grades of OA. The distinct differences in Zn and Pb distributions obtained from bones showing tidemark duplication, advanced degradation from hyaline to fibril articular cartilage as well as cartilage loss will be presented. Results indicate a resorption of the toxic element Pb into circulation in case of advanced OA. Additionally increased Zn intensities at the outer border of articular cartilage were found which could not be seen in the case of non-arthritic bones. Although changes in the Pb distribution at the tidemark could be confirmed by the SR µXRF imaging experiments, the accumulation mechanisms as well as the chemical species of Pb at the tidemark are unknown.
To determine the chemical form of Pb in human articular cartilage, X-ray absorption spectroscopy in the near edge region of the Pb L3 edge has been performed. Spectra obtained at the tidemark of a human hip-head have been compared with various Pb standard materials. The results suggest that most of the tidemark-Pb might be incorporated into the apatite structure. The presented talk will discuss the results on the elemental distribution and the chemical species of Pb in human cartilage, as well as the future perspectives of elemental imaging in samples showing different degrees of OA.

CHEMISCH-PHYSIKALISCHE GESELLSCHAFT
c/o Universität Wien, Fakultät für Physik, 1090 Wien, Boltzmanngasse 5
Tel.: +43-(0)1-4277/51108 - Fax: ++43-(0)1-4277 9511 - E-Mail: Christl.Langstadlinger@univie.ac.at
http://www.cpg.univie.ac.at - Sekretär: Ao.Univ.Prof. Dr. Georg Reischl
Vorsitzender 2007/08: Ao.Univ.Prof. Dr. Ernst Bauer, Institut für Festkörperphysik, Technische Universität Wien