

# First study worldwide to show higher concentration of trace elements in bone cancer

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In a study that is the only one of its kind worldwide, researchers from the MedUni Vienna, the Vienna Technical University and the Ludwig Boltzmann Institute have investigated the distribution of trace elements in the tissue of bone tumours. The result: tumour tissue contains higher concentrations of trace elements. This could represent a starting point for the development of targeted therapies for bone cancer.

According to estimates, around 24 patients a year in Austria are diagnosed with osteosarcoma. This makes this malignant bone tumour which, if left untreated, can be fatal, one of the most common cancers to affect the bones. Most cases are diagnosed in young people aged between ten and 25 years.

The causes of osteosarcoma are still largely unknown. Currently, surgical intervention is the only targeted treatment method, and the spectrum of effective drug-based treatments is relatively narrow compared to other types of cancer, such as breast cancer.

## High-tech investigation

This was another reason for a group of researchers led by Jochen Hofstätter of the University Department of Orthopaedics at the MedUni Vienna to shed more light on the biology of this type of cancer. Together with Christina Streli from the Atomic Institute of the Vienna Technical University and Klaus Klaushofer from the Ludwig Boltzmann Institute of Osteology, a study investigated for the first time worldwide the concentration of trace elements in bone tumours.

To do this, the affected region was first fixed via an examination under the electron microscope (backscattered electron imaging) and then investigated using synchrotron radiation, a type of X-ray radiation generated in a particle accelerator. This measurement was carried out in Germany, as Austria currently does not have the equipment to do it. Says Hofstätter: "The results show that the concentration of iron and zinc in the [tumour tissue](#) is several times higher than in healthy [tissue](#). The tumour tissue therefore appears to create an environment in which trace elements are able to form bonds more easily. We are keen, however, to investigate the role of trace elements in more detail in further studies."

## Successful interdisciplinary collaboration

Says Hofstätter: "Compared to other methods, this investigation is the most technically challenging, but also the most accurate. The results we have achieved, made possible only through the cooperation of three institutions, demonstrate how important interdisciplinary and even cross-institution collaboration is for successful research."

## New approaches to therapy

Reinhard Windhager, Head of the University Department of Orthopaedics at the MedUni Vienna and Vienna General Hospital and a member of the study group says: "In the field of drug-based therapy for osteosarcoma, there are still many unanswered questions: some tumours respond to chemotherapy, some don't. These new results could offer an approach for new, targeted and personalised forms of treatment."

**More information:** "Differential distribution of trace elements in human osteosarcoma - A Synchrotron Radiation induced confocal micro x-ray fluorescence analysis (SR  $\mu$ -XRF)", J.G. Hofstaetter, B. Pemmer, C. Weixelbaumer, M. Foelser, A. Roschger, P. Wobrauschek, R. Simon, S. Lang, M. Dominkus, R. Windhager, P. Roschger, K. Klaushofer, C. Streli.

Provided by Medical University of Vienna

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