

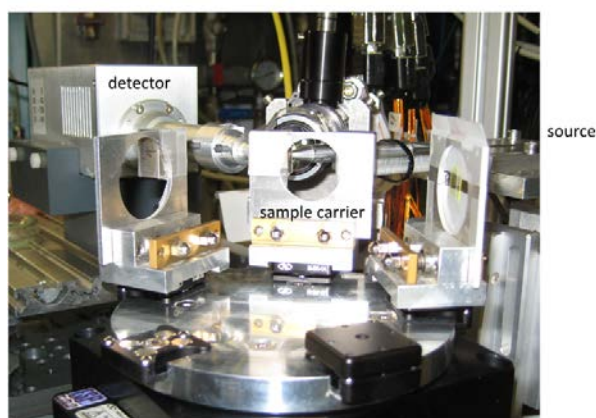
## Synchrotron radiation micro XRF analysis of zinc in osteosarcoma tissue

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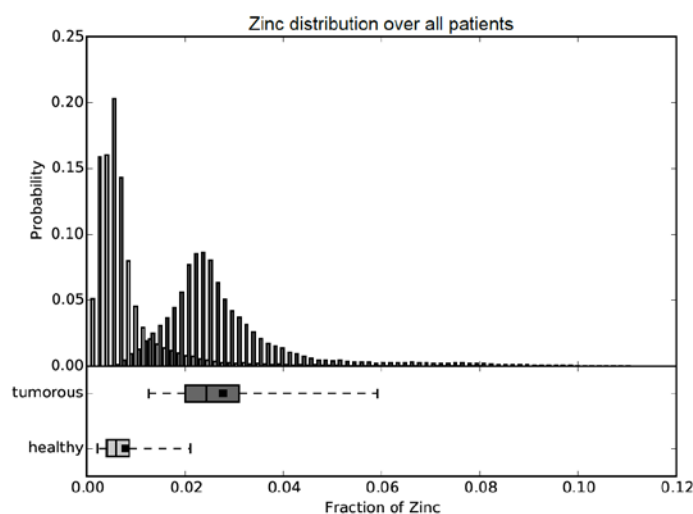
Abnormal tissue levels of certain trace elements such as Zinc (Zn) were reported in various cancer types [1]. However, very little is known about the role of Zn in osteosarcoma.

Using confocal synchrotron radiation micro X-ray fluorescence analysis (SR- $\mu$ XRF) at the ANKA FLUO beamline (Karlsruhe, Germany), we characterized the spatial distribution of Zn in high-grade sclerosing osteosarcoma tissue of nine patients (4 women /5 men) following chemotherapy and wide surgical resection. Zn levels in mineralized osteosarcoma tissue were compared to levels in adjacent normal healthy tissue. Quantitative backscattered electron imaging (qBEI) as well as histological examinations were also performed.



**Figure 1:** SR- $\mu$ XRF setup at the ANKA FLUO beamline in Karlsruhe, Germany.

We can report the following results: on average, the ratio of medians of Zn count rates (normalized to calcium) in mineralized tumor tissue was about 6 times higher than in normal tissue. There was no difference in Zn levels between tumor fraction areas with a low and a high fraction of mineralized tissue, which were clearly depicted using qBEI [2]. Moreover, we found no correlation between the Zn values and the type of tumor regression according to the Salzer-Kuntschik grading [3].



**Figure 2:** Zn fraction distribution (top) as well as boxplots (below) for the Zn fractions for healthy (light gray) and tumorous (dark gray) areas over all patients.

The underlying mechanism of Zn accumulation remains unclear. Given the emerging data on the role of trace elements in other types of cancer, our novel results warrant further studies on the role of trace elements in bone cancer.

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- [3] M. Salzer-Kuntschik, G. Dellng, G. Beron, R. Sigmund, *J. Cancer Res. Clin. Oncol.* **1983**; 106 Suppl, 21–24.

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