

PRESS RELEASE

## **New study shows improved visualization of bone healing using an innovative CT imaging technique**

Zurich, January 17, 2024 - **The novel photon counting method in computed tomography enables better imaging of bone healing after orthopedic surgery. Image distortions from metal implants (so-called implant artifacts) can now be significantly reduced by the use of a tin filter and monoenergetically reconstructed image data, a recent study at Balgrist University Hospital has shown. The research is of direct benefit to patients and was recently published in the renowned journal "Investigative Radiology".**

A pioneering study has shown that the visualization of bone healing in patients with metal implants can be significantly improved by the reduction of implant artifacts. The study was conducted by Dr. Adrian Marth, radiologist at the Swiss Center for Musculoskeletal Imaging at Balgrist Campus and led by Prof. Reto Sutter, Head of Radiology at Balgrist University Hospital. The researchers investigated the clinical benefit of the combination of tin prefiltration and virtual monoenergetic image reconstructions (VMIs) in CT examinations with a novel photon counting detector (PCD) CT system.

The study was conducted last year in 48 patients with metal implants in the feet or lower leg. VMIs with different energy levels between 60 kilo-electronvolts (keV) and 190 keV were created from the spectral image data to determine the optimal energy to reduce implant artifacts and improve the visibility of bone healing. The study demonstrated a significant advantage of CT imaging with tin prefiltration and VMIs at an energy level of 120 keV, which substantially improves the visualization of bone healing.

"To my knowledge, this is the first scientific study worldwide to show that the higher spatial resolution of photon counting CT has a clinical impact in the assessment of bone healing in patients. The significant reduction of metal implant artifacts due to tin prefiltration and monoenergetic image reconstruction and thus an overall higher image quality improves the visualization of bone healing. This is important for assessing the healing process in patients with metal implants," says Reto Sutter, Head of Radiology at Balgrist University Hospital.

Link to the study:

[https://journals.lww.com/investigativeradiology/fulltext/9900/photon\\_counting\\_detector\\_ct\\_clinical\\_utility\\_of.186.aspx](https://journals.lww.com/investigativeradiology/fulltext/9900/photon_counting_detector_ct_clinical_utility_of.186.aspx)

Reference: Marth AA, Goller SS, Kajdi GW, Marcus RP, Sutter R. *Photon-Counting Detector CT: Clinical Utility of Virtual Monoenergetic Imaging Combined With Tin Prefiltration to Reduce Metal Artifacts in the Postoperative Ankle*. *Investigative Radiology* 2024 online before print DOI:10.1097/RLI.0000000000001058

**Figure legends:**

Figure 1: Standard image (left) and virtual monoenergetic image (120 keV, right) of a photon counting computed tomography scan of the ankle with tin prefiltration. The monoenergetic image shows a significantly improved visualization of the fracture gap (arrows).

Figure 2: Photon counting computed tomography scan of a patient after hindfoot osteotomy with implantation of a bony autograft (virtual monoenergetic images with 120 keV and tin filter). An improved visualization of the boundary between the bone and the autograft (arrow) is achieved with the new technique.

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**About Balgrist University Hospital**

Balgrist University Hospital is a highly specialized center of excellence for the diagnostic work-up, treatment, and follow-up care of damage to the musculoskeletal system. Interdisciplinary services combine the fields of orthopedics, paraplegiology, rheumatology and physical medicine, sports medicine, neuro-urology, chiropractic, radiology, and anesthesiology.

The broad spectrum of interlinked medical treatment is complemented by nursing care, social and psychological counselling, legal advice, and integrated measures for rehabilitation and return to work. All these activities aim to provide our patients with the best possible support.

Balgrist University Hospital and the Balgrist Campus set internationally recognized standards in orthopedic research and education.

The privately owned Balgrist University Hospital is operated by the Balgrist Association.

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