Inter- and intra observer agreement of [18F] Positron Emission Tomography analysis to study periprosthetic bone ingrowth of an uncemented Total Hip Arthroplasty

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Introduction: The interface between bone and metal is of great importance for the stability and survival of orthopedic implants. [18F] Positron Emission Tomography/ Computed Tomography ([18F]PET/CT) can be used to measure osteoblast activity in bone adjacent to the implant but the repeatability of such measurements is unknown.

Patients and methods: We conducted a study to investigate the inter- and intra observer agreement of [18F]PET/CT of bone surrounding an uncemented femoral stem implant.
Ten patients, who had undergone uncemented total hip arthroplasty, were chosen for the study. Three months after surgery we performed a [18F]PET/CT scan of the operated hip. Three independent investigators analyzed the scans twice with an interval of one week using a software (QHPRS) developed to analyze Standardized Uptake Value, SUV. It renders 13 regions of interest, ROI´s, formed like sectors of a tube.
Two of the investigators had no previous experience in PET-analysis and received two hours of training before the study.
We then calculated the inter- and intra class correlation coefficients, ICC, using SPSS.

Results: Intra rater agreement was very high (ICC ranging from 0,95 to 0,99). The inter rater agreement was high (ICC 0,86)

Conclusion: The inter- and intraobserver agreement of [18F]PET/CT of bone surrounding an orthopedic, femoral stem, hip implant is high when analyzed with QHPRS software. Reliable analyses can be done by investigators with little training provided they hold solid anatomical knowledge.