Section: **Validierung**

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Abstract-Title:
ACCURACY MEASUREMENTS OF ELECTROMAGNETIC TRACKING (AURORA) SYSTEMS UNDER SPECIAL INTERFERENCE OF AN AXIOM ARTIS

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Abstract-Text:
Purpose
Electromagnetic tracking devices such as the AURORA (Northern Digital Inc, Canada) are subject to interference and other disturbances which may occur in a clinical environment. Purpose of this series of measurements is to determine the impact of these disturbances especially the disturbances caused by an Axiom Artis on the accuracy of an AURORA Tracking System. Various scenarios of possible positions of the tracking system as well as the Axiom Artis are considered even unlikely and impossible setups to clearly show the severe interference that may falsify the accuracy of the AURORA. Additionally, the influence of lead glass and a lead apron is examined, which are often used in proximity to an Axiom Artis. Methods
A special testing setup for the AURORA is used to measure the accuracy of the tracking device. It consists of half a sphere (Bowling Ball) and of known measurements in which two trackable probes (6DOF sensor coils) can be inserted into 50 predefined points. A special software measures the distance/angle of both probes which are relative to each other and compares them to the predefined positions on the Bowling Ball. One of the probes is a reference and always has the same position, the other probe can be attached to 47 points on the Bowling Ball. For every test scenario all possible 47 points are measured to ensure an average value for the accuracy. Results
Several test scenarios show clearly that an Axiom Artis interferes with the electromagnetic field of the AURORA. Especially the flat panel detector causes disturbances as the accuracy of the tracking system decreases if the field generator of the AURORA is close by. This happens at distances less than 30cm between field generator and flat panel detector. However, for most of the scenarios especially the likely setups, the accuracy of the AURORA is sufficient and only small deviations could be measured (less than 2mm in distance and less than 2° in angle). The distance between the field generator and the sensor coils also decreases in accuracy but is sufficient if a maximum specification distance for tracking is ensured (a maximum of 50cm of distance between the tracked coils and the field generator). No measurement shows any sign of influence of lead glass and/or a lead apron on the AURORA tracking system. Conclusion
In our tests the Flat Panel Detector of the Axiom Artis is the only relevant source of disturbance towards the AURORA tracking system in that environment. In any setup a maximum distance between the flat panel detector and the AURORA field generator

should be achieved. The minimum should be about 30 cm. A minimal distance between the field generator and the tracking area is desirable but should not be purchased with proximity to the flat panel detector. Due to the possibility of dynamic disturbance of accuracy any application using the AURORA in clinical environments should constantly monitor the accuracy of the tracking.