

AbstractID: 9471 Title: Performance of magnetic field guided navigation system for interventional neurosurgical and cardiac procedures

A physician's ability to thread a guidewire through curvy vasculature is important to the success of interventional cardiac or neurosurgical procedures. A Stereotaxis system consisting of three orthogonal superconducting magnetic coils is installed for these procedures. The physician specifies the desired orientation of the tip of the guidewire through two orthogonal fluoroscopic views produced by a pair of flat panel detectors. The navigation system then calculates and applies the desired currents to the three magnets. A specially designed guidewire with a magnetic tip is used for this purpose. Once the desired wire tip orientation is confirmed by fluoroscopy the physician would then advance the wire manually. The process is repeated when the wire tip reaches another difficult to turn location in the vasculature. We have tested the performance of the digital fluoroscopy and the navigation system. The patient exposure rate is 2.5R/min at 15 fps. High-contrast resolution ranges from 16 to 22 lp/cm depending on the magnification. A low-contrast 1.6 mm hole in a fluoroscopy penetrometer is visible. The agreement between the specified wire tip deflection and that achieved is checked with x-ray images obtained at various locations within the navigation volume. The agreement is generally within 20 degrees for deflections up to 90 degrees. However, 138 and 99 degree deflections are observed at the center and the edge of the navigation volume respectively for an 180 degree deflection request. As all tip deflections are confirmed fluoroscopically, the system is both useful and safe.