

# MediGuide™ Technology

## U.S. Fact Sheet

MediGuide™ Technology is a three-dimensional (3-D) visualization system that facilitates live navigation of special MediGuide Enabled™ catheters and CRT delivery tools within cardiac and vascular anatomy. The MediGuide Technology assists physicians as they perform complex electrophysiology (EP) procedures and cardiac resynchronization therapy (CRT) device implants in the EP lab, and is the first and only to potentially reduce the duration of radiation exposure by allowing 3-D visualization and precise navigation of devices on pre-recorded X-ray images.

### HOW DOES MEDIGUIDE TECHNOLOGY WORK?

MediGuide Technology provides physicians with the precise position of sensor enabled catheters and tools within the cardiac anatomy during minimally invasive cardiac procedures.

Similar to GPS technology that drivers use to determine the location of their vehicle on a map, the MediGuide Technology uses low power electromagnetic signals to locate a miniature sensor, which is placed in the tip of the catheter. The precise location and orientation of the catheter is tracked inside the heart and its image is then displayed on monitors in the EP lab.

At the beginning of the procedure, a short duration of fluoroscopic images are taken and then replayed throughout the procedure. This allows physicians to see a real-time, 3-D representation of the catheter tip(s) without exposing themselves, support staff and patients to additional radiation.

Automatic adjustments are made to the recorded images throughout the procedure to maintain an accurate, real-time clinical representation that compensates for respiratory changes, cardiac motion and patient movement.

### IMPACT ON RADIATION EXPOSURE

Medical imaging through an X-ray only provides a snapshot of the body and in order to accurately project images of the heart, a continued series of X-rays, also called fluoroscopy, is necessary. Fluoroscopy can result in prolonged exposure to harmful radiation for physicians, support staff, and patients.

MediGuide Technology reduces the need for live fluoroscopy by using pre-recorded fluoroscopic images. Recorded fluoroscopic images reduce the duration of exposure to radiation for patients, physicians, and support staff in the procedure room because fluoroscopy is only needed at short intervals and the short duration of the fluoroscopic images can be constantly “looped” or replayed. This is especially important for long or complicated cardiac procedures when the duration of exposure to radiation is greatest.

Physicians can continually track and update the real-time location and orientation of the MediGuide enabled tools inside the heart through the information gathered from the electromagnetic detection process.

Worldwide, physicians perform several billion radiation-based imaging studies annually, approximately one-third of which are in cardiovascular patients. According to the American Heart Association, the collective dose of ionizing radiation that patients annually received during medical tests increased among the general population an estimated 600 percent between 1980 and 2006 – a dramatic increase in human exposure to ionizing radiation.

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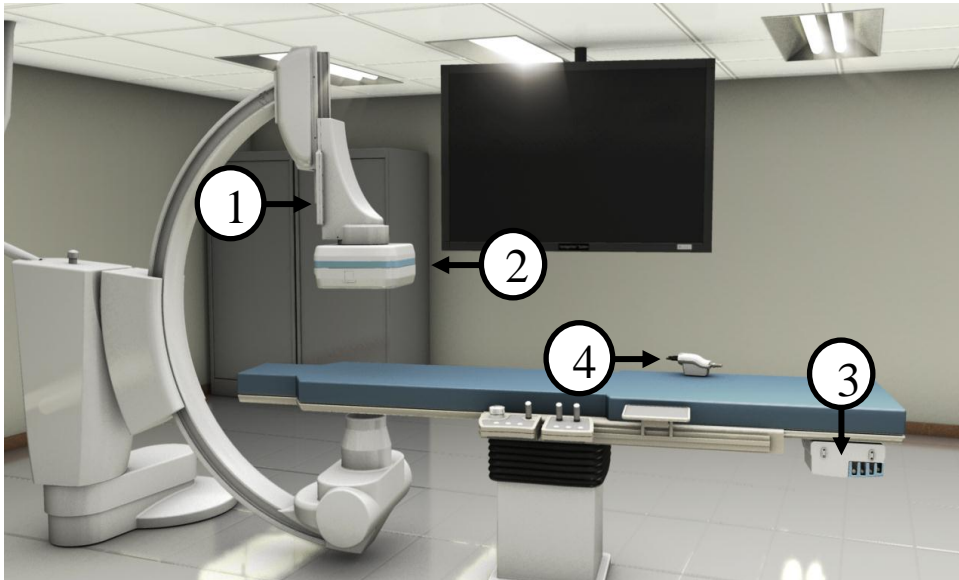
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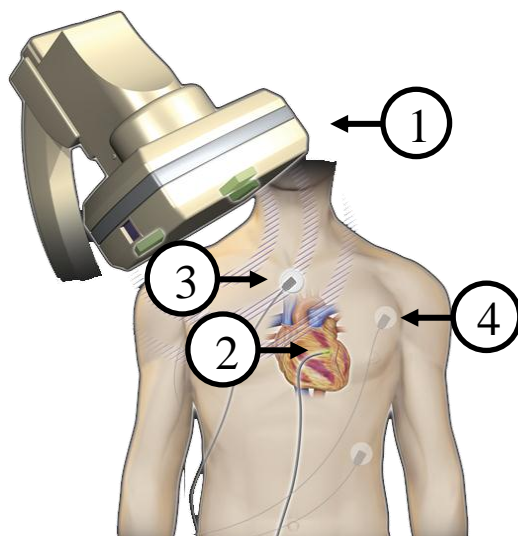
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## COMPONENTS OF THE MEDIGUIDE TECHNOLOGY



1. MediGuide™ Console: Electronic components are installed here
2. MediGuide™ Station: Electromagnetic signals are sent from here
3. MediGuide™ Connect: The reference station, the EKG MediGuide™ CathConnect and the MediGuide™ Console are all joined together here with an adhesive electrode
4. MediGuide™ CathConnect: Connection between the external devices and MediGuide™ Connect

## HOW THE MEDIGUIDE TECHNOLOGY WORKS



1. Transmitters are installed in the fluoroscopy system that emit a low-frequency electromagnetic field
2. The catheters have a sensor that receives the signals and allows their position and orientation to be projected onto an X-ray image on the monitor
3. The Patient Reference Sensor is also tracked by the electromagnetic field and this can help adjust for breathing and patient motion. EKG electrodes to monitor the heart rate during the procedure

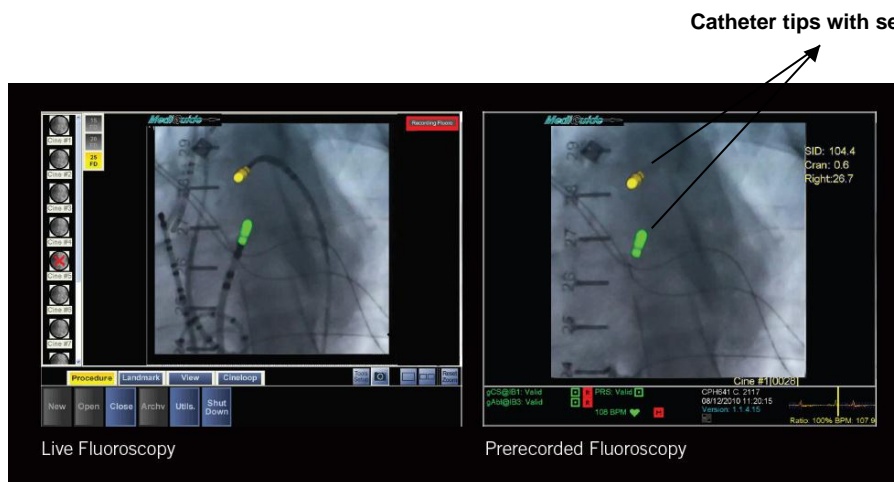
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A brief live X-ray during the procedure ensures the projected location of the tools coincides with their actual position

On the pre-recorded X-ray image, the real-time position and orientation of the catheter tips are projected

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