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Voltage Standing Wave Suppression Safety Improvement for MR-Guided Therapeutic Interventions

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Technology description

Recent advances have started to permit the use of magnetic resonance (MR), instead of the more common X-ray technique, for medical monitoring and control of certain therapeutic procedures, otherwise known as interventional MR. One such interventional MR technique is endovascular therapy, a minimally invasive surgical technique that uses the vascular system to access and treat a range of diseases such as vascular disease and tumors.

One problem with the medical devices, often catheters, used in the vascular system is a conductance phenomenon that occurs when something comes in contact with the outside of the device. Current inside and outside the device creates voltage standing waves, which disrupts the current. These voltage standing waves also create a heat buildup on the outside, which can cause tissue damage to the patient. Tightly wrapping cables, called "cable traps," around the length of the device can suppress the voltage standing waves and decrease the danger to the patient. However, this tightly wrapped cable stiffens the medical device, making it unusable for vascular insertion. UW-Madison researchers have developed a medical device for MR-guided therapeutic interventions that uses optimized cable traps to restrict dangerous heat buildup while also allowing the device to retain its flexibility. Instead of wrapping the cable along the entire length of the device, small cable traps are set up at short distances along the length. High impedance in the cable traps reduces the current on the outside of the device, while allowing no disruption in the signals transmitted to the device. The voltage standing wave then is suppressed and minimizes patient risk. This optimized cable trap safety feature can be implemented in any interventional MR imaging (MRI) device in which the conductance phenomenon exists.
The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing a medical device for magnetic resonance (MR) guided therapeutic interventions that uses optimized cable traps to restrict dangerous heat buildup while also allowing the device to retain its flexibility.

Application area

Improves safety for monitoring and control of interventional MR-guided therapy
Applicable to any MRI device in which the device sends a signal back to the internal instrument

Advantages

Reduces heat damage risk to patients
Maintains flexibility
Low cost
Easily implemented to any interventional MRI device

Institution

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