Floating Sleeve Microwave Antenna for Tumor Ablation

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Technology description

In microwave ablation, a coaxial microwave antenna is inserted into tissue in or near a tumor to deliver microwave energy to the region and remove the tumor. The specific absorption rate (SAR) pattern of energy deposited into the tumor is a function of microwave power and antenna design.
Currently, single probe percutaneous microwave ablation can only treat relatively small lesions because microwave power to the antenna must be limited; otherwise, excessive backward heating, which could burn skin and damage healthy tissue, might occur due to backpropogation of energy along the antenna (generally referred to as the tail). UW-Madison researchers have developed a novel microwave antenna that uses a floating sleeve to suppress the tail of the SAR pattern, allowing more energy to be delivered locally and evenly to the tumor while reducing the risk of detrimental backward heating. The antenna consists of coaxial antenna conductors surrounded by a floating metal sleeve that is electrically isolated from the antenna by a Teflon layer. The metal sleeve promotes destructive interference of axial microwave energy passing inside and outside of the sleeve, thus suppressing the tail of the SAR pattern and minimizing damage to healthy tissue along the antenna tail.

Application area

Microwave ablation of tumors

Advantages

Minimally invasive
Improves precision of SAR location
Provides higher bandwidth and more stable performance than currently available coaxial antennas
Delivers energy to ablate tumors at least an order of magnitude faster than conventional radiofrequency ablation
Minimizes damage to normal tissue
May be used with other techniques for reducing the heating tail
Antenna is relatively small and suitable for percutaneous operations
Does not require tuning

Institution

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Inventors

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