Abstract: NeSA202100oral-05: Radio-frequency induced heating of elongated metallic implants during MRI

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Presenter:

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Simulations and experimental measurements using phantom and a head-only transmit/receive coil on a 3T MR system were performed to evaluate temperature increases at the tip of an 8-contact SEEG electrode and an insulated wire partially immersed into the phantom. The lengths of wire producing maximum (resonant condition) and minimum (anti-resonant condition) heating were evaluated for different entry modes. For both wire and SEEG, resonant lengths were close to odd integral multiples of RF quarter wavelength in air; anti-resonant length close to even integral multiples of RF quarter wavelength, both being unaffected by the entry mode. In the resonant condition, temperature increased by as much as a factor of 10 higher than that at anti-resonant condition. For the partially immersed implants like SEEG, the resonant lengths were found to be independent of the entry modes, though the temperature increases may vary. Avoiding such lengths of cables can reduce the risk of tissue heating during in vivo MRI.