In biological tissues, it is known that the creation of gas bubbles (cavitation) during ultrasound exposure is more likely to occur at lower rather than higher frequencies. Upon collapsing, such bubbles can induce hemorrhage. Thus, acoustic inertial cavitation secondary to a 220-kHz Magnetic resonance guided focused ultrasound (MRgFUS) surgery is a serious safety issue, and animal studies are mandatory for laying the groundwork for the use of low-frequency systems in future clinical trials.

The results point to the risks associated with the method if the exposure levels are not carefully controlled to avoid inertial cavitation in the acoustic beam path. If methods can be developed to provide this control, a nonthermal approach could greatly expand the use of TcMRgFUS for precisely targeted ablation to locations across the entire brain [1)].

A work demonstrates that 220-kHz ultrasound is capable of inducing a thermal injury in the brain of living swines without hemorrhage. Although the same acoustic energy can induce either a hemorrhage or a thermal lesion, it seems that low-power, long-duration sonication is less likely to cause hemorrhage and may be safer. Although further study is needed to decrease the likelihood of ischemic infarction associated with the 220-kHz ultrasound, the threshold established in this work may allow for the detection and prevention of deleterious cavitations [2)].

1)
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2)
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