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Advantages of Air-Cooling in Thermal Ablation
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Introduction
Thermal ablation is the method of destroying tumors through extreme temperatures. Ablation provides many benefits compared to traditional surgery: it is less invasive, more time efficient, cost effective, and can treat some tumors that cannot be surgically removed. Typically, tissue heating is achieved by energy transferred through an antenna which is then inserted into a designated tumor area. To control this heat, a form of cooling is incorporated within the antenna. Without cooling, the device becomes overheated and destroys unwanted tissue, causes unnecessary pain, and yields a smaller ablation zone. Previous studies have used water cooling as the primary source of cooling. Air cooling may provide an alternative technique. This experiment will test the effects of an air cooled system and compare its results to ablation with a water cooled device and ablation with no cooling at all.

Methods
An air cooling device will be constructed at a frequency of 2.45 GHz. The device will be tested ex vivo on pieces of cow liver. The goal is to create a device that maximizes the size of the ablation zone and avoids the heating of unwanted tissue. The results of the tests using air cooling will be compared to the ablation of the cow liver with a water cooling device and with no cooling at all. In finding which cooling method is most successful, we can draw conclusions about how we can create the most efficient device to ablate tumors.

Future Applications
In discovering that air-cooling holds a greater advantage while ablating tissue over water-cooling, doctors will be able to provide better treatment to a patient. The operation is presumed to be less invasive, more efficient, and able to treat more difficult tumors.

Acknowledgments
- Hojjat Fallahi (Grad. Student in Computer/Electrical engineering)