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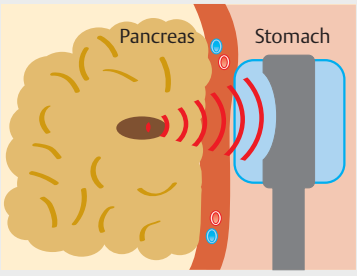
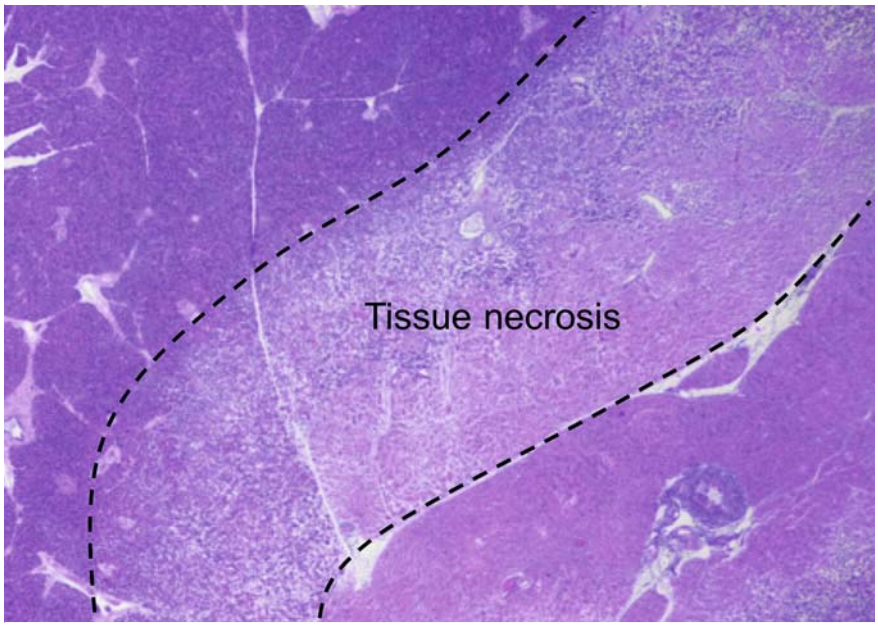
High intensity focused ultrasound: a future alternative to surgery for the treatment of localized pancreatic tumors?



▶ **Fig. 1** High intensity focused ultrasound device.



▶ **Fig. 2** Anatomopathological analysis of the targeted pancreas.

▶ **Fig. 3** Necrotic lesion in the sonicated gastric wall.

Video 1 High intensity focused ultrasound for treatment of localized pancreatic tumors.

Focal destruction procedures are a promising alternative to surgery for the treatment of pancreatic tumors [1,2]. The high intensity focused ultrasound (HIFU) device allows ultrasound beams to be concentrated at the focal point of the transducer leading to an increase in temperature and tissue necrosis without damaging interposed tissues (▶ **Fig. 1**). In order to target the pancreas while avoiding sound reflection on gastric air, an endoscopic ultrasound probe was developed (Vermon, Tours, France). This endoscopic approach allows the HIFU probe to be placed in contact with the posterior wall of the stomach. The probe combines an HIFU transducer and an ultrasound imaging probe. A balloon allows cooling of the transducer and the wall of the stomach.

Experiments were conducted on five anesthetized pigs (▶ **Video 1**). The pancreas was first located using the ultrasound imaging part of the probe. Overall, 16 transgastric HIFU sonications were performed on the tail of the pancreas. Each sonication was focused 40 mm from the probe for 45 seconds. Acoustic power was set to 64 W. Macroscopic examination of the pancreas of all pigs identified a total of seven necrotic areas with mean maximum diameter of 9.4 ± 3.5 mm. An

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anatomopathological analysis confirmed the irreversible destruction of tissues in the necrotic areas (▶ **Fig. 2**). Only one necrotic lesion was found in the sonicated gastric wall (▶ **Fig. 3**).

To summarize, it is possible to induce areas of pancreatic necrosis using the HIFU device and endoscopic ultrasound probe, with a low complication rate. At present, this technique lacks reproducibility; however, eventually all parts of the pancreas could be accessible for treatment by HIFU ablathermy, making the endoscopic route more beneficial than extracorporeal procedures.

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Competing interests

The authors declare that they have no conflict of interest.

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CORRECTION

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In the above-mentioned article, Thomas Lambin has been included as author. This was corrected in the online version on February 19, 2021.

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