

HIFU – High Intensity Focused Ultrasound Ablation

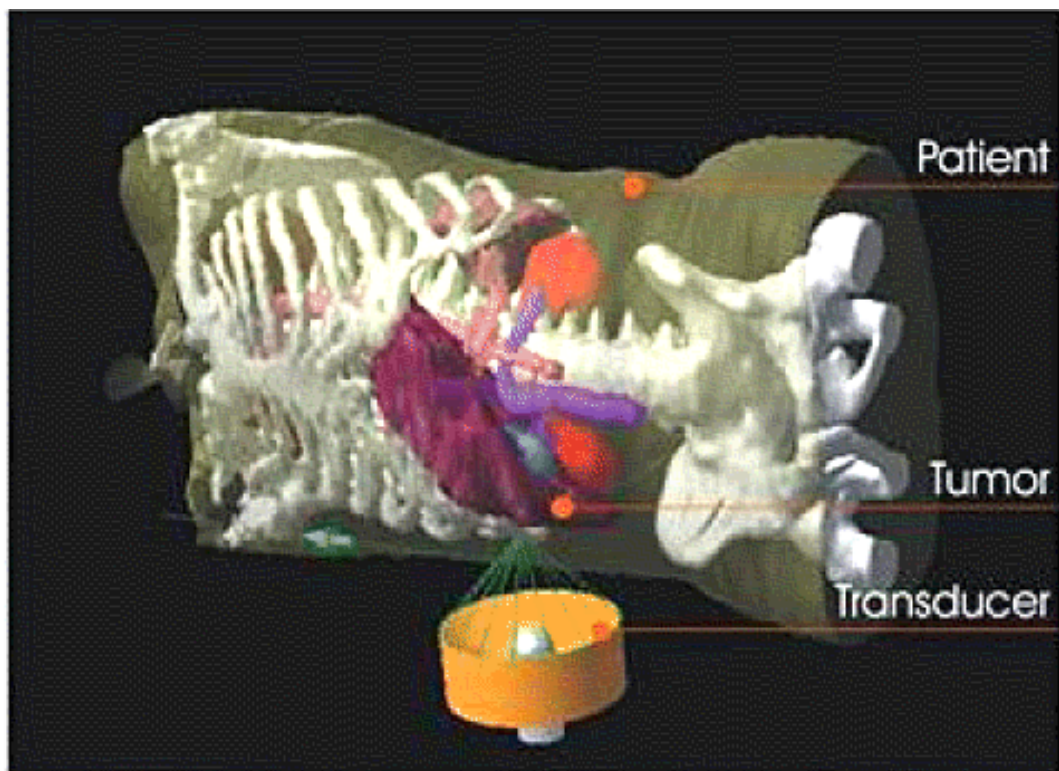
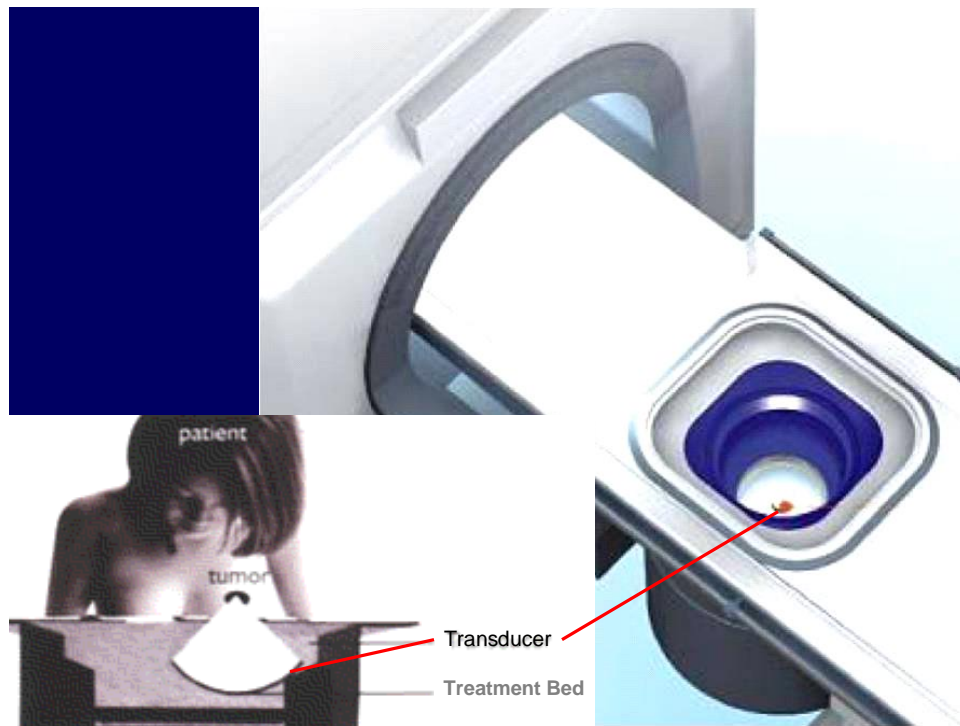
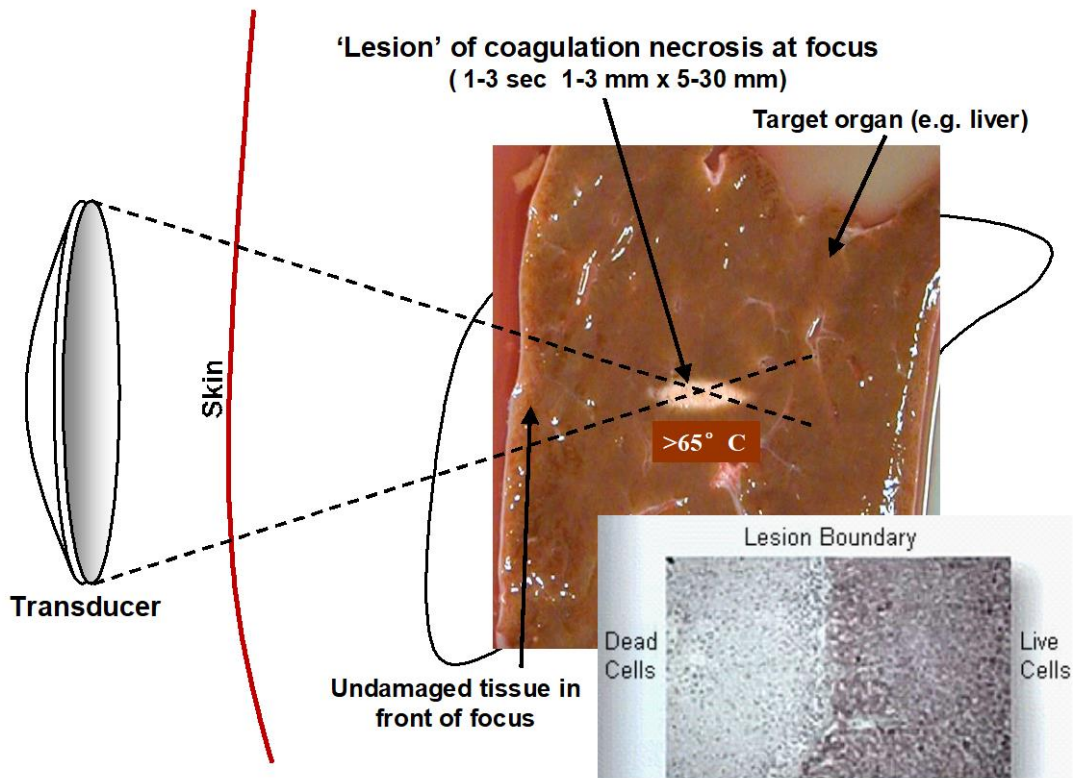
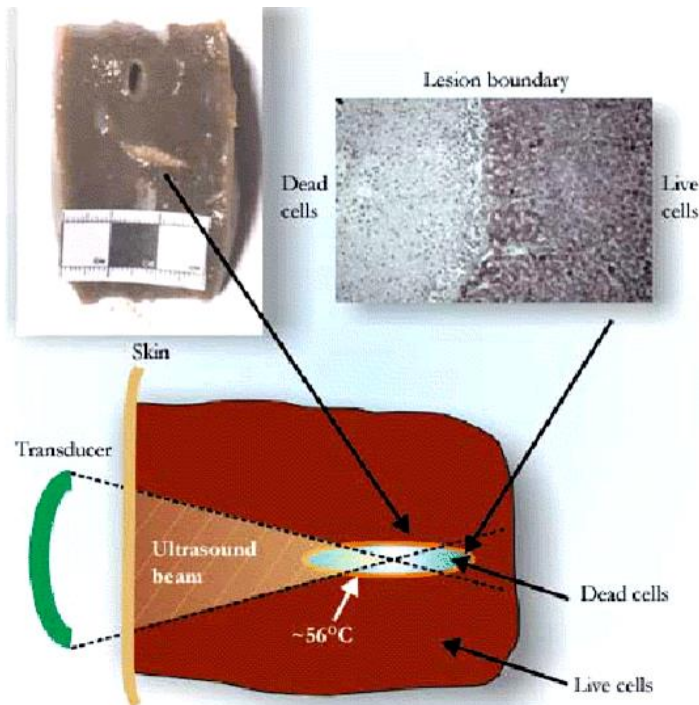


Figure showing the HIFU Transducer (orange) focusing the ultrasound beam (green lines) into the liver (brown). The patient is positioned on their right-hand side over the treatment head.

HIFU - High Intensity Focused Ultrasound



- High energy focused ultrasound beam.
- Brought to a tight focus in tissue at a distance from the source.
- Absorption of the energy leads to tissue heating.
- Causes localized temperature rise at the focal point.
- Sharply demarcated area of coagulative necrosis.
- No damage to overlying and surrounding tissue.



transient temperature of the tissue at the focus exceeds 95°C,
ideal focal region for treatment: 2mm×5mm – 3mm×12mm,
acoustic intensity within focal field: 5,000w/cm² – 25,000w/cm², therapeutic frequency: 0.8MHz – 2.4MHz,
accumulative error of linear movement: +/-1mm, system noise <=65dB(A)

Indications

- Breast cancer
- Liver cancer
- Malignant bone tumor
- Sarcoma of soft tissue
- Kidney cancer
- Carcinoma of bladder
- Tumor in pelvic cavity
- Retroperitoneal tumor
- Pancreatic cancer
- Metastasis tumor
- Palliative treatment for advanced malignant tumors
- Recurrence of solid tumors after conventional surgery
- Residual tumor after failed surgery (not suited for repeat surgical procedure)
- Superficial tumors
- Uterine fibroids / myomas
- Benign breast neoplasm
- Benign tumors of soft tissue
- Other solid tumors

Contraindications

- Tumors in air-containing viscera (such as lung, stomach, bowel)
- Mediastinal tumors
- Spinal tumors

Advantages

- One-time: without upper limitation of the tumor volume, the treatment can be conducted in one time to “ablate” the tumor completely.
- Non-invasive: patients with breast cancer can have their breasts conserved, patients with bone sarcoma can have their limbs spared and patients with hysteromyoma can have their uterus retained.
- Conformal: 3D conformal scanning techniques ensure the conformal “ablation” of the tumor.
- Real-time: real-time monitoring during treatment, real-time evaluation of the therapeutic effects and real-time adjustment of the therapeutic dose.
- Green: no radioactive harm to the patients, physicians and the environment.

HIFU do not have the following problems:

- Risk of surgery related complications
- Severe post operative pain
- Scaring, disfiguring
- Long recovery time
- Loss of active time, earnings
- Debilitation
- Haematological disorders
- Lowering of immunity
- Sickness from side effects
- Hair loss
- Multiple hospital visits

Summary of Advantages of HIFU

- One time Treatment
- Real-time US-guided Procedure
- 3D conformal
- Conservation (organs, breasts, limbs)
- Lower total cost
- Non Toxic
- Not limited by tumor size
- No hospital stay (or 1 day)
- Minor complications

However, HIFU is not a competition, but collaboration to other modalities.